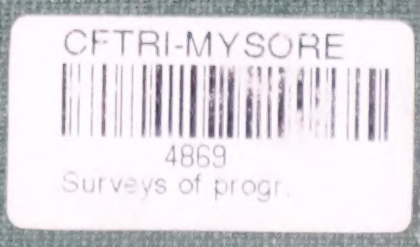

4869 ① menu planning
② questionnaires
③ respondents ④ food prefe
-rences ⑤ food consumption
⑥ foods ⑦ food acceptability
⑧ military nutrition
⑧ " feeding program

SURVEYS OF PROGRESS ON MILITARY SUBSISTENCE PROBLEMS

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1. Establishing Optimum Conditions for Storage and Handling of Semi-perishable Subsistence Items

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PREFACE

Feeding the Armed Forces of the United States is a gigantic undertaking. Uncle Sam's "family" numbers in the millions, and he is by far the largest customer of the food industries. But magnitude is not the only distinguishing feature of the job; its most interesting characteristics are complexity and variety. Many different situations are encompassed in the over-all program. During peacetime primary concern is with the relatively stable situation of feeding men during training in camps and stations within the continental United States. War and other periods of emergency magnify the normal problems of peacetime and raise the additional problems of feeding during movement, and in support, combat, and survival situations. It may be necessary to maintain troops for long periods in isolated situations where supply is difficult or where climatic extremes emphasize the importance of good feeding for both nutrition and morale.

The Armed Forces strive to anticipate and to solve the problems posed by these varying situations. Feeding systems have been evolved to adjust to the requirements of relatively constant situations where resupply is not a problem and special purpose rations have been made available for some of the situations where it is. Research is continually in progress to keep existing rations abreast of current military requirements and to design new rations adapted to the strategy and logistics of an era of nuclear warfare.

Of the problems in feeding the Armed Forces, the one which merits special emphasis is that encountered in feeding the servicemen stationed within the continental limits of the United States. This can be called the normal or typical situation which regularly involves large numbers of men. Moreover, because the situation is stable, solution of its problems will have permanent value. The motivation for the research reported here was concerned with these problems; more specifically, it was the need for information on which to base more efficient feeding plans. The series of food preference surveys whose history and findings are the substance of the present report resulted from a new attack on the problem. Action was initiated by the Food Service Division[a] of the Office of The Quartermaster General. Through their study of the economy and waste aspects of Army feeding, it was concluded that improvement could be effected by eliminating or reducing the issue of certain foods which were not generally well liked. They sought help from the Quartermaster Research and Development Division[b] in determining what foods could be classified. The problem was assigned to the Quartermaster Food and Container Institute for the Armed Forces where an active food acceptance program had been developed. Up to that time, the program had been devoted primarily to laboratory investigations; but the broader aspects of military food acceptance had also been studied, and plans for basic research leading to a large-scale survey program had been worked out. Thus, the Institute was in a position to begin work immediately on the Food Service Division's problem. Another favorable element was the establishment of the Office of the Test Director within the Quartermaster Research & Development Division about the same

[a] Since reorganized as the U. S. Army Subsistence Center, located in Chicago, Illinois.
[b] Now called the Quartermaster Research and Engineering Division.

time, since this provided the high-level coordinating and directing agency necessary for such a combined operation.

The authors are indebted to the many people who contributed to planning, collecting, tabulating, and analyzing the data. Thanks are due especially to the Quartermaster Research and Engineering Field Evaluation Agency, Fort Lee, Virginia,[C] for its able conduct of all of the field work.

DAVID R. PERYAM

Chicago, Ill.

October 1959

[C] At the time the surveys began, this organization was part of the Quartermaster Board.

Chapter 1

INTRODUCTION

Food and people's behavior toward food are interesting topics to most people--and for obvious reasons. However, the application of such knowledge concerns especially those who produce, sell, distribute, buy, prepare, or serve food.

Among those who need to know about people's food attitudes, preferences, and habits are the menu planners, whether for commercial, institutional, or home use. The largest institutional feeding program in this country is undoubtedly that of the United States Armed Forces. The problems of their menu planners provide the background and the impetus for this study of food preferences.

MENU PLANNING IN THE ARMED FORCES

The various Armed Services handle their menu planning in different ways, but the problems are basically the same, since all the "customers" come from the same subgroups of the American culture, and the Services all buy on the same markets. In the Army this planning is part of a centrally organized food service program, which formerly operated as a staff function under the Office of The Quartermaster General, but is now the responsibility of the U. S. Army Subsistence Center. The Air Force has a similar arrangement in which the food service program is a part of the Air Materiel Command. Planning is less centralized in the Navy, where primary responsibility lies with the local commands.

Menu planning is a joint affair for the Army and Air Force. Both services are represented on a menu board made up of scientists, technologists, and people with practical experience in military food service. The results of the deliberations of this board are embodied in a Master Menu which serves as the basic plan for feeding at all Army and Air Force installations. The Master Menu is published monthly, six months in advance, and is a compendium of carefully planned menus for the three meals for each day of the month. Expert knowledge of nutritional requirements and values, estimates of probable acceptability, technical knowledge of food costs, and current information on the availability of supplies are integrated into a single document. This document becomes the basis for procurement of food supplies and is a working guide at the installation level where the plans are finally executed. The Master Menu is closely adhered to except where local conditions may make certain foods nonavailable or difficult to obtain.

In performing their function, menu planners are continually faced with numerous detailed problems which may be grouped into a few major types. Nutrition is of first importance--the diet must be adequate to maintain good health and efficiency. The menus must be designed to provide sufficient calories and essential nutrients to meet established standards. Secondly, there are the economic factors. The cost of the ration is limited, being set year by year in terms of appropriated funds. Although the money available per man will fluctuate to a certain extent according to over-all trends in food prices, it is always at a level which prohibits luxury expenditures. Careful planning is required to achieve

adequate, attractive meals. Any temporary utilization of a more expensive food has to be compensated somewhere by use of a cheaper one. Another factor is economic in a broader sense. Because of the large amounts of food required, menus must be planned with an eye to the effects of the Service's food purchases on the country's markets. Seasonal foods must be utilized when they are reasonably plentiful; when they are in short supply, they must be eliminated from the menu or their serving reduced. A fourth, perhaps lesser, factor is utility. There are restrictions on freedom in selecting foods and specifying their method of preparation because we are dealing with a mass feeding operation, and preparation and serving must be accomplished with specifically limited numbers of personnel and types of equipment.

Finally, there is the all-important problem of food consumption. The carefully planned, nutritionally balanced, calorically adequate, economically feasible menu fulfills its purpose only when the foods are eaten. If enough food is provided for every man at every meal, as required by regulation in all the Services, there will always be a certain amount left over, but any major and continual rejection of food indicates partial failure of the system. It means that at least some of the men are being fed below the optimum for health and efficiency and that effort and money are being wasted. That intangible factor--morale--is also involved here. Even if food is not rejected, we may legitimately be concerned with whether the men are satisfied or dissatisfied. Food and food service have always been focal points for soldiers' complaints. In many instances, of course, complaints about food may be only a substitute expression of dissatisfaction related to other causes; but, where significant rejection of food is observed, it is always accompanied by many complaints. When there are complaints without the significant rejection, we may conclude that the food is either causing or intensifying poor morale even though nutrition remains adequate.

Considerations of acceptability enter into all menu planning, whether consciously and methodically, or on a common sense basis. The Service menu planner continually makes decisions which affect over-all acceptability. He not only selects the foods, but also specifies method of their preparation, the way they are combined with other foods into meals, and how frequently they are repeated in the menu pattern. His most useful guides in making these decisions are knowledge of foods and past experience with the men's reactions to the foods included in the menus. How well he puts together the available information, and the accuracy of his decisions about acceptability are critical in determining the final adequacy of the ration and its effects on morale. In fact, acceptability is defined in terms of consumption and morale--an acceptable food is one that will be eaten, and eaten with pleasure and satisfaction.

MEASUREMENT OF ACCEPTABILITY

When the importance of having organized information about acceptance eventually was recognized, another deficiency became apparent. Appropriate and accurate methods of measurement were not available and had to be developed. The earliest investigations of food acceptability within the Military consisted of observations of individual or group reactions to foods, such as the proportion of men who would take certain items on the serving line or the amount and proportion of waste for

foods of various types. Although such objective data are important in understanding acceptance phenomena, they have serious limitations. Studies of this type are not only tedious and expensive to conduct, but the results are usually so dependent upon particular local conditions that they are difficult to generalize. They tend to provide only isolated bits of information that cannot be used to predict acceptance for large groups of men.

An alternative approach is to seek out and attempt to measure certain general factors which bear on food acceptance in any situation. These may be found among individual group attitudes. Particularly important is that attitude, or set of attitudes, which result in expressions of "like" and "dislike" or, as it is commonly stated, in expressions of preferences. Even though preference is only one of many factors which will determine actual acceptance or nonacceptance of a food in a given situation, it is unquestionably important. Moreover, the direction of the effect is always predictable even if its extent is not. Common sense and observation support the validity of this assertion--a person tends to eat what he likes and tends to reject what he dislikes. Empirical evidence on validity is presented in Chapter 5. The collection of attitude data is relatively easy. The behavioral tendencies represented by a person's preference attitudes appear to be solidly "built in." One can state his attitude toward a food with little effort at any time--either without its being present or when it is before him on the table.

The great variability of individual preferences may appear to be an obstacle. Group preferences, however, tend to remain stable even though attitudes may differ markedly among individuals. This is particularly cogent in dealing with military food acceptance problems. Here, it is not a matter of catering to individual preferences but, rather, of anticipating and adjusting to the response of large groups of men. Therefore, individual differences could be safely disregarded if group preferences were reliably known. The general relationship between preference and actual food acceptance has been recognized for a long time, and group attitudes have often been investigated to obtain information about the acceptability of foods. The approach was used in a limited way in connection with military food acceptance problems during and after World War II; however, prior to the work reported here, it was not employed consistently and in a broad enough scope for the results to have much more than local significance.

THE APPROACH

Initially, a two-way attack on the problem was planned: (1) surveys of stated preferences and (2) studies of actual food consumption and waste in the mess halls. However, comparison of results of consumption and waste studies obtained during 1949 by the Field Evaluation Agency with the results of the first survey showed that the preference approach was superior. The amount of information provided was greater and the data could be obtained more quickly and more economically. Full reliance was therefore placed on the attitude surveys.

The problem as originally presented was one of practical and immediate importance--almost a "trouble shooting" operation. There was a number of foods whose acceptability was more or less suspect, and the suggested task was merely that of reliably identifying the culprits.

However, analysis of the problem indicated that this could not be accomplished simply by concentrating effort on the suspect foods, since preference and acceptability are, above all, relative. It was apparent, too, that acceptability may vary with certain factors other than food type which are also under control of the menu planners, the chief ones being frequency of serving and menu combinations. When the first data became available, their utility in menu planning suggested the value of extending the original problem. Thus, the scope of the project came to include: (a) obtaining preference information for all food items and dishes important in Army feeding, (b) investigating the relation of preference to frequency of serving, and (c) investigating preference for menu combinations.

The Quartermaster Corps' food preference survey program has continued over a period of ten years. To date there have been eight surveys. Objectives have been clarified during this period and procedures adjusted. Mistakes have been made and corrected; but the lack of complete uniformity which characterized the developmental period of the project affected primarily the peripheral issues. The central purpose and basic method were held constant throughout; therefore, a comprehensive report is not only possible, but is also a logical development.

Although the extensive investigation of preference ended with the fifth survey, the program has continued. Its major objective is still that of providing information to help solve specific problems in Service menu planning. The main emphasis is now on such problems as frequency of serving, optimal menu combinations, and the reliability and predictive value of the data. It has been demonstrated that this is a fruitful approach for research on the factors underlying preferences, attitudes, and food habits.

The first survey was conducted in February 1950, and four more were completed during 1950 and 1951. Preference ratings were established for about 400 items, which included those foods and recipes most important in Service feeding, and some information on frequency of serving and food combinations was obtained through associated pilot studies. In the sixth, seventh, and eighth surveys, conducted in 1952-54, primary emphasis was on testing the stability of preference for foods included in the previous surveys, although some new food items were included. The seventh and eighth surveys incorporated a special investigation of the development of attitudes toward soluble coffee. As each survey was completed, the results were made available to food service personnel of the Armed Services in the form of summary reports, and the information has been used extensively in devising the Master Menus for the Army and Air Force.

With the conclusion of the preference phase represented by the first five surveys, an evaluation of the status of the program was deemed to be in order. It was later decided to critically examine the results for their meaning and value, and to evaluate the survey methodology. Such a complete analysis and organized presentation of the survey results would maximize their value to the Armed Forces. At the same time, it would make them available to other interested groups, such as various segments of the food industries, people in the field of nutrition, those involved in institutional feeding, and scientists concerned with problems of food acceptance. The survey program itself would benefit in gaining

a firmer foundation for its further extension through evaluation of methodology and determination of the relative importance of problems.

NATURE OF THE RESEARCH

The problem was clear-cut from the practical standpoint of one who states a difficulty; it was not so from the viewpoint of one who must seek the solution. The locus of the problem was the general field situation represented by the usual practices of feeding the Army at permanent camps. Although this area is not clearly defined, it has certain boundaries and its characteristics vary within reasonable limits. This field situation had to provide all information: to develop the methods, to define the problems, to discover the pertinent variables in the system and, of course, to get the practical answers.

The project began with procedures that were essentially untried. There was no assurance that they would be adequate to develop useful information and discover relationships in an area where systematic investigation had been the exception rather than the rule. Sufficient evidence was available on the basic scaling method to indicate that it would find differences, both among foods and among people. Whether or not the data would be reliable or would have real meaning in regard to the phenomena of actual food behavior, which were the subject of investigation, had to be established on the basis of results obtained within the project itself.

The main substance of this report is factual; its major purpose is to present the results that were obtained. However, since the facts themselves would have limited value outside of the context in which they were obtained, another objective has been to describe the planning, the methods and procedures used, and the problems encountered. Even the mistakes that were made and recognized deficiencies in the program have been presented as important parts of that context. Methods and results have been critically examined both statistically and from the rational viewpoint. The question of the validity of the data for predicting actual acceptance behavior has been accorded particular importance.

METHODOLOGICAL CHOICES

Some key factors that must be considered in conducting a survey program are: (a) the kind of information required, (b) how it is to be obtained, and (c) the definition and sampling of the respondent population. Early in the development of the program certain decisions were made in these areas which effectively shaped the course of the research. They were guided by known principles of survey work, by past research on food acceptance in military situations, and to some extent by certain new hypotheses about group food preferences.

The most important factor in determining the nature and scope of the program was the choice of affective attitudes toward food as the subject matter for investigation. We elected to obtain data on the general **like** or **dislike** for foods rather than on responses to particular samples of food upon specific occasions. This choice was based on the belief that such data would be more reliable and would have a more general significance for prediction of acceptance. It also greatly simplified the mechanics of data-taking, since a simple list of food names could serve as the stimuli in attitude studies.

A second important decision was that the information should be obtained by means of a questionnaire completed anonymously by the respondent himself and not through interviews. This not only facilitated the collection of data but also gave the respondent assurance that he could state his personal opinions freely. Survey specialists are not unanimously agreed that this control is necessary. The opinion has been advanced that the face-to-face interview does not inhibit the soldier respondent. However, since the issue was still in doubt, the possibly greater accuracy and completeness of personal interview data did not outweigh the apparent advantages of the group questionnaire method.

Finally, the test population, although already broadly determined by the original problem, was more specifically defined as consisting of all Army enlisted men stationed within the United States. Therefore, the approach of selecting and sampling "representative" installations was rejected in favor of probability sampling.

Chapter 2

DESIGN OF THE QUESTIONNAIRES

Careful design of a questionnaire can reduce ambiguities and improve accuracy, thereby increasing the probability of getting useful results. The questionnaire must be understood, must present a task to the respondents which they can handle without too much difficulty, and must create interest and sustain it throughout the test period. However, efficiency sometimes dictates compromise of these principles to simplify tabulation and to obtain as much information as possible at a given time.

Problems encountered in designing the questionnaire included the following: (a) selection of the psychometric method, (b) development of its particular characteristics, (c) determination of the optimum questionnaire length, (d) manner of describing foods, (e) instructions to the respondents, (f) methods of measurement of factors related to preference, such as desired frequency of serving and menu combinations, and (g) background information which should be obtained about the respondent. Some of these problems had to be resolved arbitrarily; others were resolved on the basis of what was reasonable in light of the survey literature and military experience in other situations. However, many of the questions were answered by pilot testing in the laboratory or in the field.

PSYCHOMETRIC METHOD

Affective attitudes, which in the present context we generally call preference, may be measured in several ways, the most common being ranking, paired comparisons, and rating scales. The only real choice was between the last two. The ranking method was not seriously considered because of the impracticality of expecting a respondent to provide valid ranking for more than a limited number of items at one time. The paired comparison method also is disadvantageous because of the amount of effort involved since the number of comparisons which the respondent is required to make increases rapidly as the number of items increases. The rating scale method entirely avoids such a difficulty. The stimuli are presented and responded to singly so that each new item represents only a small increment in the task of completing the questionnaire. Rating-scale data are also easier to tabulate and analyze. Further, the results can be generalized beyond the specific group of stimuli included in a single test with better justification than can those obtained by the other two methods. The rating-scale method clearly offered many practical advantages. There remained the question of its reliability and its power to discriminate between stimuli relative to paired comparisons which, at that time (1949) was the standard method for the investigation of preferences.

Data pertinent to this problem were available from an experiment conducted in 1947 at an Army camp. The test compared the results of the rating-scale method with the results obtained in parallel by a modification of the paired-comparison method. Two questionnaires were utilized in the study. Each soldier-respondent completed both, but at different sessions. One questionnaire required the respondent to rate 160 foods on a 7-category rating scale whose points were described in successive degrees of like and dislike. This scale was similar to the one even-

tually adopted for use in the survey program (see Figure 2.5). other form required the respondent to construct menus by choosin tween pairs of logically competing items, i.e., two desserts, two tables, two meats, etc. Both sets of results were used to establish tive preference values for all items within the different compet groups. For the paired comparisons data the over-all percentag choices for each food was obtained; and, for the rating scale, the cessive intervals method was applied to obtain relative preferen The degree of correspondence between results of the two methods measured by rank order correlation of the positions of the items w each food group. The 12 correlations ranged from +.70 to +1.00, w mean of +.89. It was concluded that the two methods were, fo practical purposes, equally well-suited for determining relative pr ences among food items.

On the basis of these results, the rating-scale method was sel for use in the surveys. Later evidence from other sources verified findings. Thurstone* used a similar approach and found that rating results predicted first choices from a list with an average discrep of only 2.3 percent. Pilgrim and Wood[10] have reported on the com bility of the two methods for laboratory taste-tests. Thus, whil original decision to use the rating scale was in reality a "best gu and was influenced to a major extent by considerations of conven and efficiency, the propriety of that choice has been more than quately supported.

LENGTH OF SCALE

The scale finally selected had nine categories. While it was developed for use in the preference surveys, the same 9-point form hedonic scale) was adopted for use in laboratory investigations of preferences. It has proved to be a reliable and very useful devic both laboratory and field tests[8], but in 1949 there had been little e ience with its use. The 9-point form had been selected for labor use on the basis of only brief pretesting with actual food sampl was therefore advisable to test the factor of scale length specif with the type of questionnaire being considered for the surveys.

An experiment was conducted to obtain information on scale l and on total length of the questionnaire at the same time. Sets of tionnaires were made up to include food lists of 50, 100, and 150 i Three different scale lengths were used, with the successive cate described as follows:

9-category scale	7-category scale	5-category scale
like extremely		
like very much	like very much	like very much
like moderately	like moderately	like moderately
like slightly	like slightly	
neither like nor dislike	neither like nor dislike	neither like nor
dislike slightly	dislike slightly	
dislike moderately	dislike moderately	dislike moderately
dislike very much	dislike very much	dislike very much
dislike extremely		

* Thurstone, L. L. Personal communication.

Personnel of the Chicago Administration Center served as test subjects. Each person completed one of the questionnaires and later repeated on the same form after an interval of about two weeks. Using reproducibility of the mean ratings for the various foods as the criterion, the 9-category scale was as good as the shorter one, the reliability coefficients for the 5-, 7-, and 9-category scales being +.92, +.89, and +.96, respectively. Further, the 150-food forms were no less reproducible than those with shorter lists. Since previous work[5] had shown that, in general, longer scales tend to discriminate better between stimuli, the 150-food, 9-category questionnaire was selected for pilot testing in the field.

The results of research completed more recently have supported the decision to use the 9-point hedonic scale. In this study[6], nine different scale types, differing in length from 5 to 9 categories, in the way the categories were described, and in regard to certain other characteristics, were compared for test-retest reliability and for ability to discriminate among items in a list of 20 foods. The tests were run with groups of soldiers at Army posts. Alternate form reproducibility was relatively invariant across all forms, but discrimination among the foods generally improved with increasing scale length. Although two 8-point scales proved to be slightly superior to all the 9-point forms, the exact form used in the food preference surveys was the equal of the other 9-point scales. However, no change was made in the preference scale used either in later surveys or in the laboratory because the advantage of having conformity with previous results was more important than the slight increase in discrimination that might result with the 8-point scales.

QUESTIONNAIRE LENGTH

It was anticipated that the number of foods included in the questionnaire might have an important bearing on the respondent's performance, because of the repetitious nature of the task. The 150-food questionnaire, using the 9-point scale, was chosen for field testing to obtain more information on this point. A pilot test was conducted in August 1949, at Fort Riley, Kansas, using 400 enlisted men as respondents. Although the lengthy questionnaire had proved quite satisfactory with Chicago Administration Center personnel, deficiencies were noted in the field situation. For example, in the later sections of the questionnaire there were numerous runs of identical ratings, many individual foods were skipped, and even whole pages were omitted. Apparently the soldiers' different orientation resulted in a lesser degree of motivation. It was apparent that the maximum permissible length was no more than 60 foods. To be on the safe side, only 45 foods were included in the questionnaires for the first two surveys. Inasmuch as these early surveys gave no indication that this number approached the limit, some of the subsequent surveys were extended to 54 foods.

SCALE DIRECTION

There are two ways of placing a horizontal rating scale on the page. *A priori*, it would appear equally reasonable to place either the **like** or the **dislike** end on the left hand side, next to the food name. In the absence of evidence to the contrary it had to be assumed that this factor of scale direction could affect the responses. One solution would have been to use both directions in alternate forms, but this would have com-

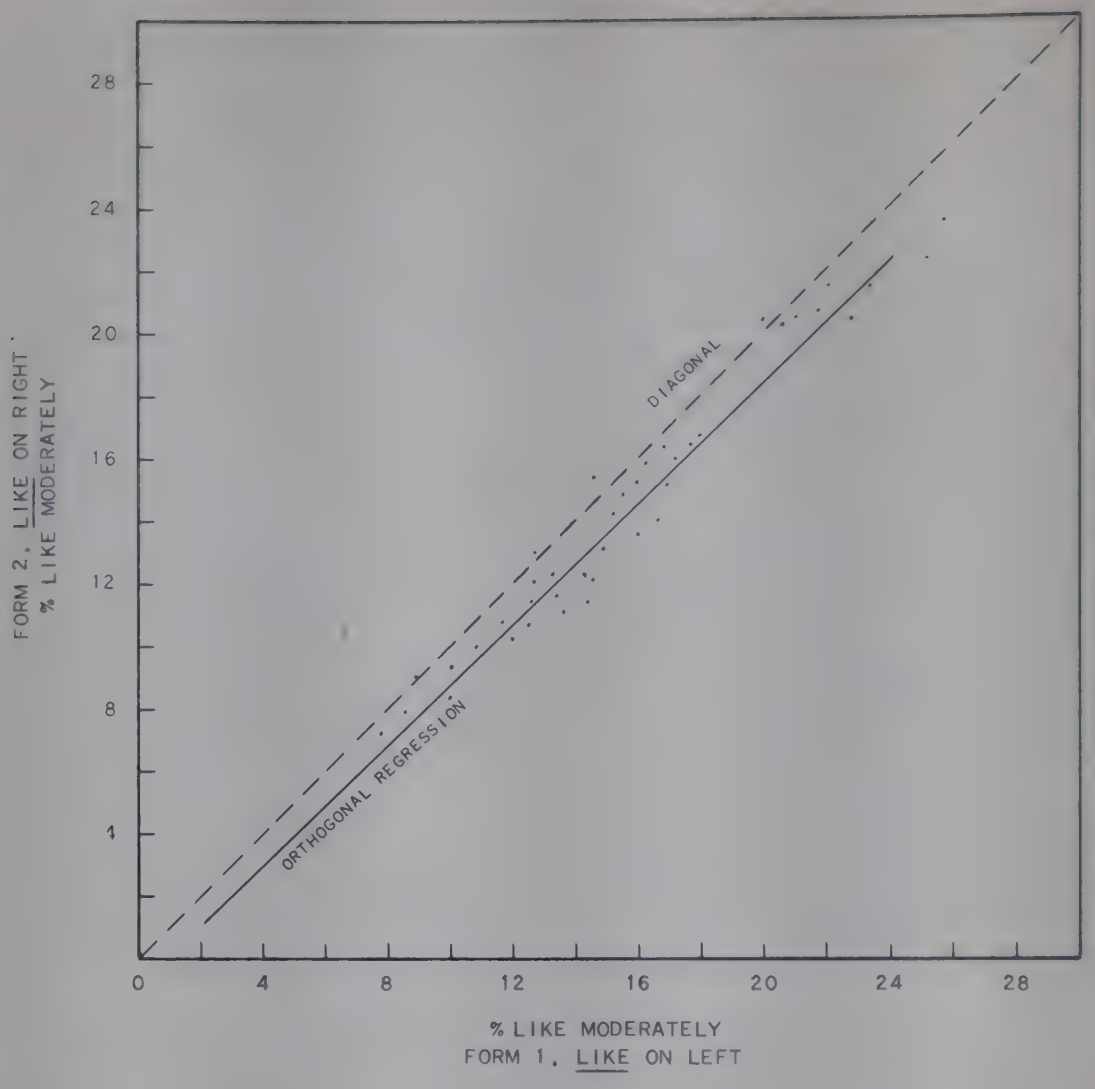

FIGURE 2.1 Effect of scale reversal on percentage of responses in the category, **like moderately,** for each of 45 foods.

TABLE 2.1

Orthogonal regression equations for the proportion of ratings in each preference category of two questionnaire forms with reversed-scale direction

Category	Regression equation[a, b]		Correlation coefficient
	a	**b**	
Like extremely	-.59	1.0310	.998
Like very much	.59	.9347	.998
Like moderately	-.83	.9683	.974
Like slightly	1.45	.8433	.975
Neither like nor dislike	.38	1.0730	.964
Dislike slightly	.55	.8049	.973
Dislike moderately	-.07	1.3176	.962
Dislike very much	.35	1.1281	.985
Dislike extremely	.48	1.1105	.992
Not tried	.04	.9395	.995

[a] Coefficients of the equation, $y = a + bx$, where **x** is the standard form (**like** on the left) and **y** is the reversed form.

[b] A perfect relationship exists when $a = 0$ and $b = 1.0$.

plicated the printing of the forms, the field work, and the tabulation of the data. Since it was anticipated that the effects of scale direction would be minor and might not be clearly evident with only a small number of cases, this factor was not included in the preliminary testing of the questionnaire but was left for the first large-scale survey.

Two questionnaires which differed only in the direction of the scale were used in Survey 1. In Form 1, **like extremely** appeared on the left; in Form 2 the direction was reversed, with **dislike extremely** on the left. These forms were interspersed and each respondent completed only one. The survey results were analyzed to determine whether or not the scale reversal had affected the total distributions, the means, or particular categories. The orthogonal regression across all 45 foods, between the proportions of ratings on the two forms, was determined for all nine categories. The constants of the corresponding regression equations are given in table 2.1. This relationship was analyzed graphically for each category and examples of the resulting charts are given in Figures 2.1 and 2.2. Both the line of orthogonal regression and the diagonal, $y = x$, are shown on the charts. In the absence of a scale-direction effect, the two lines should coincide at least within the limits of sampling error.

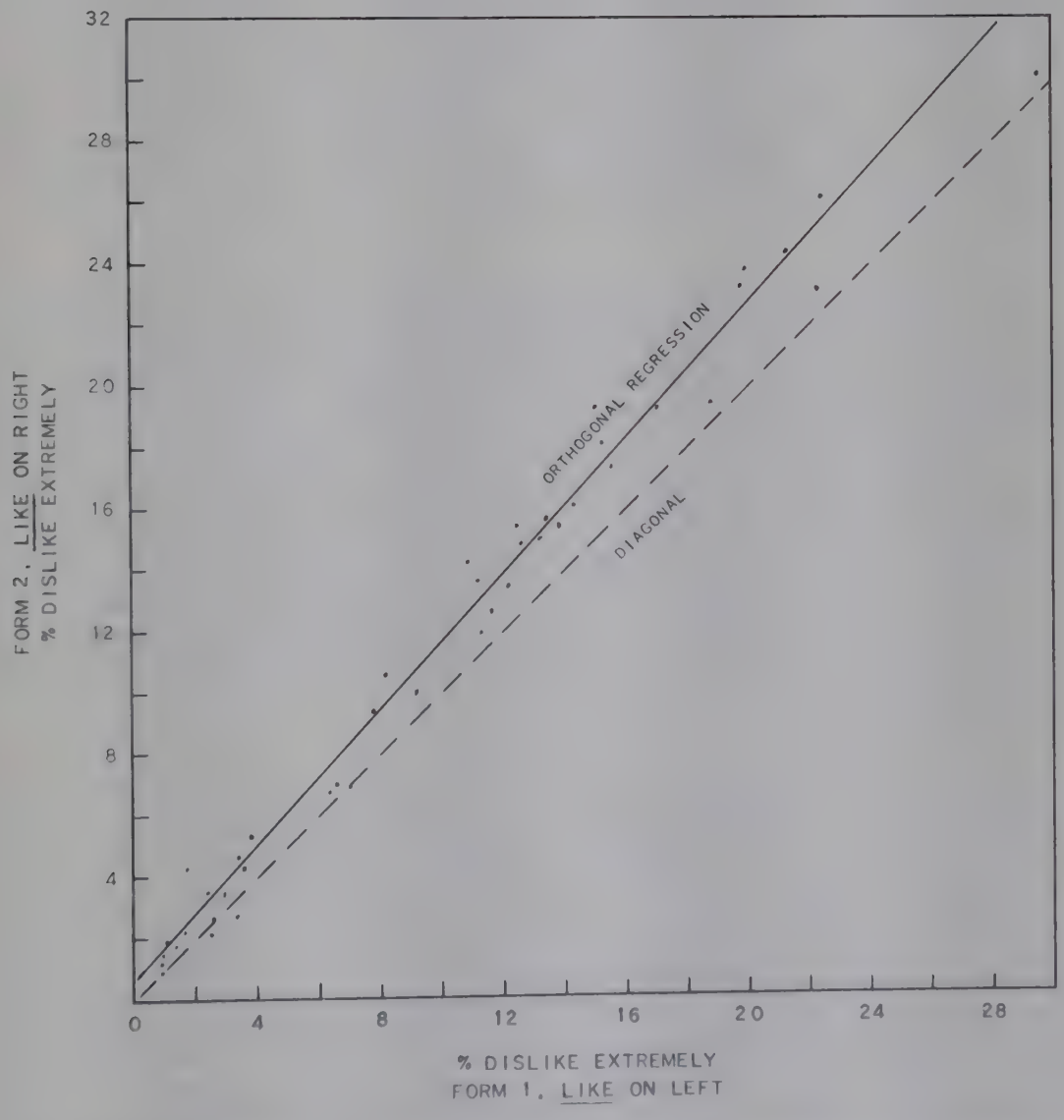

FIGURE 2.2 Effect of scale reversal on percentage of responses in the category, **dislike extremely,** for each of 45 foods.

Exact coincidence was found only for **like extremely,** which indicates that this rating was used as much whether it appeared first or last. Differences for the other **like** ratings were slight, although nearly all the points for **like moderately** (Figure 2.1) lie below the diagonal, indicating higher proportion of usage when the scale began with **like extremely. Neither like nor dislike** showed the opposite trend. **Dislike slightly** showed considerably more scatter than any of the others, but no consistent trend. The regression lines for the three lowest categories of **dislike** all lay above the diagonal, showing more frequent use of these ratings when the scale began with **dislike extremely.** The regression lines for **dislike moderately** and **dislike extremely** (Figure 2.2) tended to diverge from the diagonal. Higher proportions of ratings in these categories should therefore tend to cause greater differences between the two forms.

To test for the significance of these scale-direction effects, the frequency of use of each scale category, i.e., the proportions of respondents who used it for 0, 1, 2, etc., foods, was determined for each form and the Chi-square test of the homogeneity of two-sample distribution was applied. The differences for the categories **dislike extremely, dislike very much, dislike slightly, like slightly,** and **like very much** were significant at or beyond the 5-percent level. Table 2.1 gives the correlation between the proportions of ratings on the two forms, computed across all foods for each scale category separately. All are above +.96. This nearly perfect relationship indicates that, notwithstanding the significant difference for some of the categories, one form of the scale will predict the proportions of responses in each category of the other with a high degree of accuracy.

The distributions of proportions of ratings in each category on each form were obtained for the individual foods and the Chi-square test of homogeneity of the two distributions was applied. The differences were significant beyond the 1-percent level for 27 foods, between the 5-percent and 1-percent level for 5 foods, and for the remaining 13 foods they were not significant. Since most of the effect of scale reversal was on the **dislike** categories, it would be expected that foods with relatively high proportions of ratings on the dislike side would be most affected. There was a tendency toward lower Chi-square values for better liked foods, but the distributions for some of the high preference foods were significantly different, and the differences for some very low preference foods were not.

Since the analyses in this report are mainly concerned with mean ratings rather than distributions of ratings, the effect of scale reversal on this statistic is most important. Figure 2.3 shows the relationship of the mean ratings obtained from the two forms for the 45 foods in Survey 1. To obtain the means, the values 1-9 are assigned to the successive categories beginning with **dislike extremely.** The ratings tend to be lower, indicating lower preference, with Form 2, which began with **dislike extremely.** However, the correlation coefficient of +.997 for the 45 pairs of food means indicates a nearly perfect relationship between the two forms. The maximum difference between mean ratings was about 0.4 and only two foods reached this level; more than half of the foods differed by less than 0.2 scale points.

There can be no sufficiently accurate external criterion by which to compare the two scales for accuracy. It cannot be assumed that the results from either are unbiased; and, although combination of the two would probably lessen the effects of bias, it would not eliminate them. The goal, however, was to establish relative preference. The assumption seemed reasonable that any bias due to scale direction would affect all foods in the same way, and any possible theoretical advantage of using both forms was more than counterbalanced by the very definite practical advantages of avoiding the additional labor involved. Therefore, only one scale direction was used in the remainder of the surveys. The one with **like extremely** on the left was chosen.

QUESTIONNAIRE FORMAT

The first page presented the general instructions to the respondents. The instructions were also read aloud to them (see Chapter 3). Figure 2.4 shows an instruction page from Survey 6.

Figure 2.5 is one of the pages from the main body of the questionnaire for Survey 6. This format was standard for all surveys except for

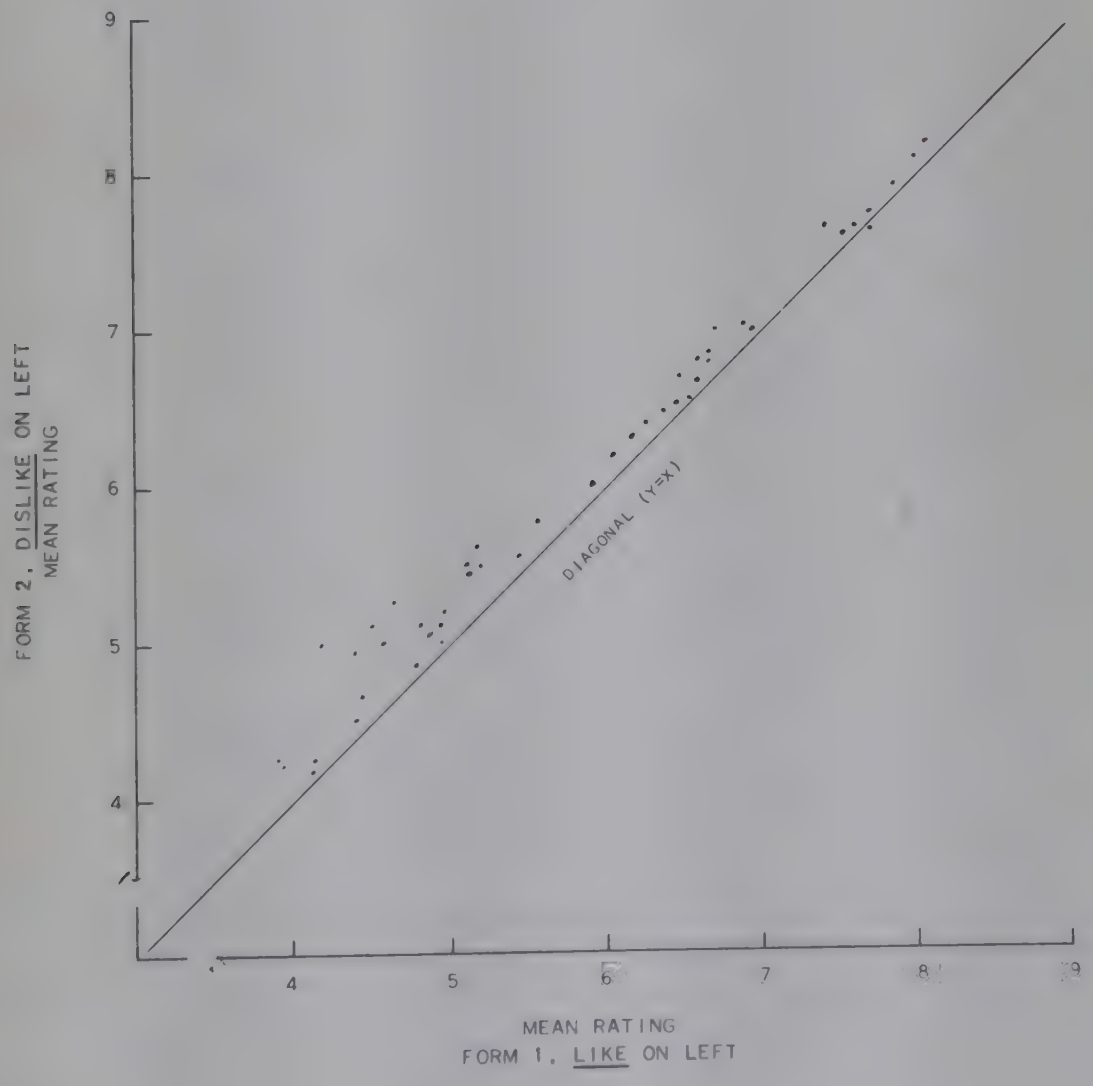

FIGURE 2.3 Effect of scale reversal on mean ratings of 45 foods.

a change in the position of the precode numbers for the response categories which took place after Survey 3. For the first three surveys the numbers were overprinted in each space, primarily to aid the key-punch operators. The precode numbers were later placed only at the top of each page because of the possibility that the overprinting might confuse some respondents.

BACKGROUND FACTORS

Most adult behavior has originated in or has been modified by experience, and experience has certainly contributed to the formation of the complex behavioral tendencies represented by attitudes toward food. The scope of learning activities is determined by many factors pertaining to the individual and his environment, such as age, sex, economic status, place of residence, and a host of others. Insofar as food preferences are learned, they will be affected by these background variables. The degree of this effect, as opposed to the effect of unlearned physiological factors, is not known, but uncontrolled observation indicates that it may be large.

Of the number of such variables that may affect food preferences, some will be more important than others, and the degree of importance may vary among individuals and among groups. Important interactions among the factors are certain to occur. Many of the experiences that enter into the development of food preferences will be peculiar to the individual and thus difficult to classify reliably, so that their effects on group attitudes could be measured. The possibility is great that their over-all effects would be random. However, other experiences may be dependent upon an individual's membership in groups that can be defined fairly objectively. In that case, the possibility exists of determining whether membership in the group, and, by implication, common experiences that are associated with such membership, have any effect on food preferences. Background factors of this type will be most relevant in a mass investigation such as the present one.

Six background factors were selected for investigation in the series of surveys. The main purpose was to explore some of the interesting possibilities discussed above of relationships between population characteristics and food preferences. Although one might hope that the results would be useful for Service menu planning, this goal was not likely to be achieved. Personnel at military installations tend to be mixed, rather than composed of discrete groups definable on the basis of characteristics important to food preferences. Therefore, the most generally practical approach is to select foods and plan menus on the basis of the average preference of the entire Army population.

The six factors were selected with certain restrictions. The necessity of limiting the number of factors meant omitting many that were thought to be potentially important. Further, the questionnaires were to be completed in class sessions with only a minimum of assistance; hence, the questions had to be limited to those which could be answered adequately under such conditions. The factors used were picked on a "best judgment" basis as likely to show important variations in preference and to be relatively easy to measure. It is recognized that many factors that were disregarded may also be important. One page in each survey was devoted to the background information.

Figure 2.6 shows the form used in the first survey and Figure 2.7 the form used in Surveys 3, 4, and 5. The same six factors were always included, but certain minor changes were made in the response categories during the course of the surveys. These changes affected the presentation of the results and raised some difficulties in their interpretation. After Survey 1, the response categories of the "size of town" item were expanded from four to six. Other changes made after Survey 2 were as follows: (a) the multi-area category was omitted from the region of origin, (b) the category "less than two months" was added to the length of service, (c) the category "attended business or trade school" was added to education, and (d) two new items, G. and H. in Figure 2.7 were added, although they were not used in the analyses.

PILOT STUDIES OF RELATED PROBLEMS

Each survey was utilized to obtain certain information in addition to degree of preference and the respondent's background. Investigation of scale reversal in Survey 1, described above, required only the use of two different forms. However, beginning with Survey 2 an extra page was added to each questionnaire in order to explore other problems. This added page was always completed last so that it could not affect the respondent's attitude toward the major task of completing the preference section. Since the task presented on the extra page always differed from the task in the preference section, lowered motivation should not have affected responses on the former to any great extent.

Surveys 2 and 3 were utilized for pilot studies on the problem of desired frequency of serving. One of the two questionnaire pages, developed on the basis of preliminary work in the laboratory, is shown in Figure 2.8. Pilot work on preference for menus was begun in Survey 4, and was continued with a different approach in Survey 5. An example of one of the types of questionnaires used is shown in Figure 2.9. Survey 6 attempted to determine whether or not the soldier was satisfied with the thickness of bread slices as served in the Army, a relatively minor problem but one in which there was considerable interest at the time. The questionnaire page is not shown. A new kind of problem was approached in Surveys 7 and 8. Preference for soluble coffee was measured in Survey 7 which was administered prior to a six-month period during which soluble coffee was substituted for the regular brewed coffee at certain installations. Survey 8 was conducted at the end of that period and measured post-test preference for soluble coffee. There were several different forms of the soluble coffee preference page. Figure 2.10 shows one of them.

DIFFERENCES AMONG THE SURVEYS

Table 2.2 illustrates the similarities and differences in the surveys and shows the shifts in emphasis as they progressed. Points to be particularly noted include: (a) the reduction in the total number of respondents per questionnaire form; (b) the increased length of the food list after Survey 2; (c) the succession of "additional information" studies; and, (d) the change in emphasis to "repeat" foods after Survey 5.

TABLE 2.2

Summary description of survey questionnaire

Survey	Form	Number of respondents	Date	No. of foods in both forms		Additional information	Instruction for rating
				Total	Repeats		
1	-	5973	Feb 1950	45	0	Scale reversal	Foods as eaten in the Army
2	-	4757	Aug 1950	36	5	Frequency of serving	Foods as eaten in the Army
3	A	3702				Frequency of serving	Foods in general
	B	3974	Feb 1951	108	5		
4	A	3152				Food combinations	Foods in general
	B	3092	Jun 1951	108	5		
5	A	2367				Menu preferences	Foods in general
	B	2906	Sep 1951	108	5		
6	A	2391				Bread slice thickness	Foods in general
	B	2375	Jun 1952	108	68		
7	A	2914				Soluble coffee pretest	Foods as eaten in the Army
	B	2914	Nov 1953	85	72		
8	A	2039				Soluble coffee post-test	Foods as eaten in the Army
	B	2082	May 1954	85	85		

Food lists identical with Survey 7.

The Quartermaster Board
Fort Lee, Virginia

FOOD PREFERENCE QUESTIONNAIRE

This is not a test. This is a questionnaire to find how popular or unpopular certain foods are with men in the army—how much you like or dislike these foods.

For each food listed in the following pages, circle the reply which tells how much you like or dislike that food. If you are not familiar enough with a food to know how much you like or dislike it, circle "Not tried" for that food. Circle only one reply for each food.

EXAMPLE: If you dislike asparagus very much, circle "Dislike Very Much" after asparagus, as shown below. If you are not familiar enough with broccoli to know how much you like or dislike it, circle "Not Tried" for that food as shown in the second example. Take all the time necessary to consider your reply for each food. You will be given sufficient time to complete your questionnaire.

		9	8	7	6	5	4	3	2	1
NOT TRIED	ASPARAGUS	LIKE EXTREMELY	LIKE VERY MUCH	LIKE MODER-ATELY	LIKE SLIGHTLY	NEITHER LIKE NOR DISLIKE	DISLIKE SLIGHTLY	DISLIKE MODER-ATELY	DISLIKE VERY MUCH	DISLIKE EXTREMELY
NOT TRIED	BROCCOLI	LIKE EXTREMELY	LIKE VERY MUCH	LIKE MODER-ATELY	LIKE SLIGHTLY	NEITHER LIKE NOR DISLIKE	DISLIKE SLIGHTLY	DISLIKE MODER-ATELY	DISLIKE VERY MUCH	DISLIKE EXTREMELY

If you have any questions, do not hesitate to ask any member of the team conducting the survey.
(Cooperative survey conducted by the QM Food and Container Institute and the QM Board, OQMG.)

FIGURE 2.4
Instruction page for Survey 6.

		9	8	7	6	5	4	3	2	1
NOT TRIED	BUTTERED BROCCOLI	LIKE EXTREMELY	LIKE VERY MUCH	LIKE MODER-ATELY	LIKE SLIGHTLY	NEITHER LIKE NOR DISLIKE	DISLIKE SLIGHTLY	DISLIKE MODER-ATELY	DISLIKE VERY MUCH	DISLIKE EXTREMEL
NOT TRIED	CHILI CON CARNE	LIKE EXTREMELY	LIKE VERY MUCH	LIKE MODER-ATELY	LIKE SLIGHTLY	NEITHER LIKE NOR DISLIKE	DISLIKE SLIGHTLY	DISLIKE MODER-ATELY	DISLIKE VERY MUCH	DISLIKE EXTREMEL
NOT TRIED	FRIED FISH	LIKE EXTREMELY	LIKE VERY MUCH	LIKE MODER-ATELY	LIKE SLIGHTLY	NEITHER LIKE NOR DISLIKE	DISLIKE SLIGHTLY	DISLIKE MODER-ATELY	DISLIKE VERY MUCH	DISLIKE EXTREMEL
NOT TRIED	ROAST BEEF	LIKE EXTREMELY	LIKE VERY MUCH	LIKE MODER-ATELY	LIKE SLIGHTLY	NEITHER LIKE NOR DISLIKE	DISLIKE SLIGHTLY	DISLIKE MODER-ATELY	DISLIKE VERY MUCH	DISLIKE EXTREMEL
NOT TRIED	STEWED APRICOTS	LIKE EXTREMELY	LIKE VERY MUCH	LIKE MODER-ATELY	LIKE SLIGHTLY	NEITHER LIKE NOR DISLIKE	DISLIKE SLIGHTLY	DISLIKE MODER-ATELY	DISLIKE VERY MUCH	DISLIKE EXTREMEL
NOT TRIED	CORNED BEEF AND CABBAGE	LIKE EXTREMELY	LIKE VERY MUCH	LIKE MODER-ATELY	LIKE SLIGHTLY	NEITHER LIKE NOR DISLIKE	DISLIKE SLIGHTLY	DISLIKE MODER-ATELY	DISLIKE VERY MUCH	DISLIKE EXTREMEL
NOT TRIED	BUTTERED TURNIPS	LIKE EXTREMELY	LIKE VERY MUCH	LIKE MODER-ATELY	LIKE SLIGHTLY	NEITHER LIKE NOR DISLIKE	DISLIKE SLIGHTLY	DISLIKE MODER-ATELY	DISLIKE VERY MUCH	DISLIKE EXTREMEL
NOT TRIED	HOT GRIDDLE CAKES	LIKE EXTREMELY	LIKE VERY MUCH	LIKE MODER-ATELY	LIKE SLIGHTLY	NEITHER LIKE NOR DISLIKE	DISLIKE SLIGHTLY	DISLIKE MODER-ATELY	DISLIKE VERY MUCH	DISLIKE EXTREMEL
NOT TRIED	POTATO CHOWDER	LIKE EXTREMELY	LIKE VERY MUCH	LIKE MODER-ATELY	LIKE SLIGHTLY	NEITHER LIKE NOR DISLIKE	DISLIKE SLIGHTLY	DISLIKE MODER-ATELY	DISLIKE VERY MUCH	DISLIKE EXTREMEL

FIGURE 2.5
Questionnaire page for food preference from Survey 6.

FIGURE 2.6
Questionnaire page on background information from Survey 1.

FOOD PREFERENCE LIST
BACKGROUND INFORMATION

(52-53) A In the following list, locate the state or states in which you spent most of your life before you were 16 years old. If these states are all in one region, place a check mark in front of the group of states in which the state or states are located. Do not check more than one number. If you travelled, or lived in different regions for short periods of time, check No. 11.

(01).....Northwest: Ore., Wash., Idaho.
(02).....Rocky Mountains: Nev., Colo., Wyo., Utah, Mont.
(03).....Southwest: Calif., New Mex., Ariz.
(04).....South Central: Texas, La., Okla., Ark.
(05).....Great Plains: Mo., Ia., Kan., Neb.
(06).....North Central: N. Dak., S. Dak., Minn.
(07).....Middle West: Ill., Ind., Wis., Mich.
(08).....Southeast: Miss., Ala., Tenn., Fla., N.C., S.C., Va., Ga., Ky.
(09).....East Central: Ohio, Pa., N.Y., N.J., Del., W. Va., Md.
(10).....New England: Me., Mass., N.H., Vt., R.I., Conn.
(11).....Lived in more than one region or travelled constantly.
(12).....Outside the United States.

(54) B Where did you spend most of your life before you were 16? Do not check more than one category. If you spent part of your childhood in a city and part in a small town or on a farm, check the place where you spent the greatest number of years.
(1).....On a farm
(2).....In a small town
(3).....In a city (over 30,000 people)
(4).....In a very large city (New York, Chicago, Philadelphia, Los Angeles, Detroit).

(55) C How long have you been in the army? (Include all your service.) (Check one)
(1).....Less than six months
(2).....Six, but less than eighteen months
(3).....Eighteen, but less than thirty-six months
(4).....Three years or more

(56) D How long did you serve overseas? (Check one)
(1).....Was not overseas at all
(2).....Was overseas less than six months
(3).....Six months, but less than one year
(4).....One year, but less than two years
(5).....Two years or more

FIGURE 2.6 (Cont'd)

(57) E Your age at your last birthday. (Check one)

(1).....Under 20 years
(2).....20 but less than 25
(3).....25 but less than 30
(4).....30 but less than 35
(5).....35 but less than 40
(6).....40 or over

(58) F Education (Check one of the following)

(1).....Did not complete Eighth Grade
(2).....Completed Eighth Grade
(3).....First year, High School
(4).....Second year, High School
(5).....Third year, High School
(6).....Fourth year, High School
(7).....Attended College (whether completed or not)

FIGURE 2.7

Questionnaire page on background information from Surveys 3, 4 and 5.

BACKGROUND INFORMATION

(61) A. Check the group which includes your age on last birthday.

(1).....Under 20 years
(2).....20 but less than 25
(3).....25 but less than 30
(4).....30 but less than 35
(5).....35 but less than 40
(6).....40 or over

(62-63) B. Check the **REGION** in which you lived the longest time **before you were 16 years old.** Check only one of the following.

(01).....Northwest (Ore., Wash., Idaho)
(92).....Rocky Mountains (Nev., Colo., Wyo., Utah, Mont.)
(03).....Southwest (Calif., New Mex., Ariz.)
(04).....South Central (Texas, La., Okla., Ark.)
(05).....Great Plains (Mo., Ia., Kans., Neb.)
(06).....North Central (N. Dak., S. Dak., Minn.)
(07).....Middle West (Ill., Ind., Wis., Mich.)
(08).....Southeast (Miss., Ala., Tenn., Fla., N.C., S.C., Va., Ga., Ky.)
(09).....East Central (Ohio, Pa., N. Y., N. J., Del., W. Va., Md.)
(10).....New England (Me., Mass., N. H. Vt., R. I., Conn.)
(11).....Outside the United States

(64) C. Check **one** category below to show where you spent **most** of the time before you were 16 years old.

(1).....On a farm
(2).....In the country but not on a farm
(3).....In a village with fewer than 2500 people
(4).....In a small city with between 2500 and 25,000 people
(5).....In a city with between 25,000 and 100,000 people
(6).....In a large city with between 100,000 and one million

(65) D. Education (Check one of the following)

(1).....Did not complete Eighth Grade
(2).....Completed Eighth Grade
(3).....Completed First Year, High School
(4).....Completed Second Year, High School
(5).....Completed Third Year, High School
(6).....Completed Fourth Year, High School

FIGURE 2.7 (Cont'd)

(7).....Attended Business or Trade School (whether completed or not)
(8).....Attended College (whether completed or not)

(66) E. In all, how long have you been in the army? Check one.

(1).....Less than two months
(2).....Two, but less than six months
(3).....Six, but less than 18 months
(4).....18, but less than 36 months
(5).....Three years or more

(67) F. How long did you serve overseas? Check one.

(1).....Not at all
(2).....Less than six months
(3).....Six months, but less than one year
(4).....One year, but less than two years
(5).....Two years or more

(68) G. Where do you now live? Check one.

(1).....On the post in barracks.
(2).....On the post in family quarters
(3).....Off the post

(69) H. Where do you eat most of your meals? Check one.

(1).....In a company mess hall
(2).....In a consolidated mess
(3).....In other than army mess

Questionnaire page on desired frequency of serving from Survey 3.

FIGURE 2.8

FOOD ITEM	HOW OFTEN WOULD YOU LIKE TO EAT EACH OF THESE FOODS? CIRCLE ONE ANSWER AFTER EACH FOOD.							
1. BREAD PUDDING	TWICE A DAY	ONCE A DAY	SEVERAL TIMES A WEEK	TWICE A WEEK	ONCE A WEEK	ONCE EVERY TWO WEEKS	ONCE A MONTH	RARELY OR NEVER
TIMES PER MONTH:	60/MO.	30/MO.	15/MO.	8/MO.	4/MO.	2/MO.	1/MO.	-
2. VEGETABLE SOUP	TWICE A DAY	ONCE A DAY	SEVERAL TIMES A WEEK	TWICE A WEEK	ONCE A WEEK	ONCE EVERY TWO WEEKS	ONCE A MONTH	RARELY OR NEVER
TIMES PER MONTH:	60/MO.	30/MO.	15/MO.	8/MO.	4/MO.	2/MO.	1/MO.	-
3. SCRAMBLED EGGS	TWICE A DAY	ONCE A DAY	SEVERAL TIMES A WEEK	TWICE A WEEK	ONCE A WEEK	ONCE EVERY TWO WEEKS	ONCE A MONTH	RARELY OR NEVER
TIMES PER MONTH:	60/MO.	30/MO.	15/MO.	8/MO.	4/MO.	2/MO.	1/MO.	-
4. APPLESAUCE	TWICE A DAY	ONCE A DAY	SEVERAL TIMES A WEEK	TWICE A WEEK	ONCE A WEEK	ONCE EVERY TWO WEEKS	ONCE A MONTH	RARELY OR NEVER
TIMES PER MONTH:	60/MO.	30/MO.	15/MO.	8/MO.	4/MO.	2/MO.	1/MO.	-
5. ROAST TURKEY	TWICE A DAY	ONCE A DAY	SEVERAL TIMES A WEEK	TWICE A WEEK	ONCE A WEEK	ONCE EVERY TWO WEEKS	ONCE A MONTH	RARELY OR NEVER
TIMES PER MONTH:	60/MO.	30/MO.	15/MO.	8/MO.	4/MO.	2/MO.	1/MO.	-
6. CHOCOLATE CREAM PIE	TWICE A DAY	ONCE A DAY	SEVERAL TIMES A WEEK	TWICE A WEEK	ONCE A WEEK	ONCE EVERY TWO WEEKS	ONCE A MONTH	RARELY OR NEVER
TIMES PER MONTH:	60/MO.	30/MO.	15/MO.	8/MO.	4/MO.	2/MO.	1/MO.	-
7. CREAMED CORN	TWICE A DAY	ONCE A DAY	SEVERAL TIMES A WEEK	TWICE A WEEK	ONCE A WEEK	ONCE EVERY TWO WEEKS	ONCE A MONTH	RARELY OR NEVER
TIMES PER MONTH:	60/MO.	30/MO.	15/MO.	8/MO.	4/MO.	2/MO.	1/MO.	-
8. BAKED TUNA FISH AND NOODLES	TWICE A DAY	ONCE A DAY	SEVERAL TIMES A WEEK	TWICE A WEEK	ONCE A WEEK	ONCE EVERY TWO WEEKS	ONCE A MONTH	RARELY OR NEVER
TIMES PER MONTH:	60/MO.	30/MO.	15/MO.	8/MO.	4/MO.	2/MO.	1/MO.	-
9. SPAGHETTI AND MEAT BALLS	TWICE A DAY	ONCE A DAY	SEVERAL TIMES A WEEK	TWICE A WEEK	ONCE A WEEK	ONCE EVERY TWO WEEKS	ONCE A MONTH	RARELY OR NEVER
TIMES PER MONTH:	60/MO.	30/MO.	15/MO.	8/MO.	4/MO.	2/MO.	1/MO.	-

FIGURE 2.9

A menu combination page from Survey 4.

POTATOES

Select one with each meat

Potato patties
Cold potato salad
Fried
Mashed sweet potatoes
Scalloped, with cheese
Steamed rice
Candied sweet potatoes
Creamed
Baked sweet potatoes
Hot potato salad
Mashed
French fried
Lyonnaise
Potato chips
Potatoes boiled in skins
Scalloped
Parsleyed (boiled)
Hash-browned
Baked
Oven browned

VEGETABLES

Select one with each meat

Green peas
Spinach
Hot spiced beets
Boiled (dried) lima beans
String beans
Baked beans
Corn on cob
Scalloped onions
Turnips
Creamed asparagus
Creamed fresh carrots
Stewed tomatoes
Broccoli
Green lima beans
Succotash
Cauliflower
Baked Hubbard squash
Sauerkraut
Creamed corn
Boiled cabbage

SALADS

Select one with each meat

Pickled beet
Cabbage slaw
Head lettuce, dressing
Combination
Carrot and raisin
Orange and grapefruit
Peach and cottage cheese
Wilted lettuce
Deviled eggs
Jellied fruit
Kidney bean
Tomato and cucumber
Asparagus
Apple and raisin
Apple and celery
Jellied vegetable
Cabbage and pineapple
Fresh sliced tomatoes
Mixed fruit
Cucumber and onion

FIGURE 2.9 (Cont'd)

What would be your choice of potato, vegetable and salad with each of the meats listed below? Select one item from each of the above lists and write it in the proper space following each meat. For example, if you would choose baked potatoes, string beans and combination salad to go with liver, you write these foods after "Liver" as shown in example.

	Meat	Choice of Potatoes	Choice of Vegetables	Choice of Salads
EXAMPLE:	Liver	Baked	String Beans	Combination
	1. Beef stew	_____	_____	_____
	2. Roast chicken	_____	_____	_____
	3. Baked ham	_____	_____	_____
	4. Fried fish	_____	_____	_____
	5. Hamburger steak	_____	_____	_____

FIGURE 2.10

Questionnaire page on soluble coffee from Surveys 7 and 8.

46. Are you ordinarily a coffee drinker? YES _____ NO _____

47. Even though soluble coffee (coffee powders, instant coffee, etc.) has not been served in your mess hall, we would like you to indicate how much you like or dislike it.

NOT TRIED	SOLUBLE COFFEE	LIKE EXTREMELY	LIKE VERY MUCH	LIKE MODER-ATELY	LIKE SLIGHTLY	NEITHER LIKE NOR DISLIKE	DISLIKE SLIGHTLY	DISLIKE MODER-ATELY	DISLIKE VERY MUCH	DISLIKE EXTREMELY

48. How often have you used soluble coffee? (Check one answer below.)

_____ frequently

_____ occasionally

_____ rarely

_____ never

49. How well do you like soluble coffee as compared with regular brewed coffee? (Check one answer below.)

_____ Like soluble coffee better

_____ Like both about the same

_____ Like brewed coffee better

Chapter 3

SELECTION OF RESPONDENTS AND ADMINISTRATION OF QUESTIONNAIRE

The previous chapter presented the device for obtaining the desired kind of information. For the information to be generalizable to the population that concerns us, it must come from that population in an unbiased manner. Therefore, the administration of the survey program to select the respondents and the administration of the questionnaire are presented together.

SAMPLING PROCEDURE

Respondents were selected in accordance with a predetermined sampling plan. Selection of a purely random sample, e.g., by means of Army personnel serial numbers, was impracticable because of the labor that would have been involved not only in selecting the sample but also in conducting the surveys. The procedure used was an adaptation of the method of block sampling which has been used by the Bureau of the Census in making its population surveys. It involved stratified multistage systematic sampling with the sampling ratios adjusted so that the *a priori* probability of an individual's being selected was the same regardless of his unit or location. This method was recommended by the Attitude Research Branch of the Office of the Secretary of Defense, an organization with broad experience in making studies of attitudes within the Armed Forces. They designed the original sampling plan in 1949 and helped to set up the samples for the first three surveys. The Quartermaster Food and Container Institute for the Armed Forces then assumed the full responsibility and followed the same plan for the remaining surveys.

The process of selecting the sample involved three stages:

1. **Selection of Installations.** All Army installations in the United States having an enlisted strength of more than 500 men were divided into four groups according to enlisted strength. All installations in the highest strength category were included in the survey. Installations in each of the remaining size-groups were further classified into 2-5 subgroups in such a way that the installations within each subgroup would be similar with respect to location (major geographical area) and type of military activity. From each subgroup one installation was selected at random for surveying.

2. **Selection of Units Within Installations.** Within a given installation, all units submitting an individual morning report were listed in order of their size, those with more than 400 men separately from those with fewer. All of the larger units were included in the sample. In order to yield the same over-all sampling rate, the sampling rate for the smaller units was determined in relation to the size-group of the particular installation. For installations in the smallest size-group, all units under 400 were selected; for the other size-groups, a random method was used. In order to assure randomness, the sampling sheets for each installation were precoded by means of check marks placed on specific lines at constant intervals with a random beginning. Thus the

process of listing the units automatically selected those to be included in the sample.

3. **Selection of Individual Respondents.** Selection within a unit was based on the morning report. Taking the names as listed thereon, the first individual was selected by a predetermined random start; then every **nth** name was taken, **n** being determined by the sampling ratio for the unit.

Table 3.1 illustrates the sampling process with the sampling ratios for installations, units, and individuals for Surveys 1-4. The sampling plans for the later surveys were essentially the same, differing only in certain minor details. Within each survey the same over-all sampling ratio was maintained, the individual ratios being adjusted so that

TABLE 3.1

Sampling ratios for Surveys 1-4

Installation size-group	Rate of sampling installations	Units of less than 400 men		Units of more than 400 men[a]
		Unit Rate	Individual Rate	Individual Rate
Survey 1				
I	all	1/8	1/4	1/32
II	1/2	1/2	1/8	1/16
III	1/4	all	1/8	1/8
Survey 2				
I	all	1/8	1/4	1/32
II	1/2	1/4	1/4	1/16
III	1/4	all	1/8	1/8
Survey 3				
I	all	1/10	1/6	1/60
II	1/2	1/6	1/5	1/30
III	1/3	1/4	1/5	1/20
IV	1/5	all	1/12	1/12
Survey 4				
I	all	1/12	1/7	1/84
II	1/2	1/7	1/6	1/42
III	1/3	1/7	1/4	1/28
IV	1/4	1/3	1/7	1/21
V	1/7	all	1/12	1/12

[a]All units included in the sample

NOTE: The sampling plan for Survey 5 differed somewhat from the previous four, and is not amenable to this type of simple ratio breakdown.

the probability of an individual's selection was the same regardless of the size of his installation or unit. For example, in both Surveys 1 and 2, the over-all sampling ratio was 1/32 of the assigned Army strength. An individual at a large installation (size-group I) and in a small unit (less than 400) had one chance in 32 of being selected, since the sampling rate for small units was 1/8 and that for individuals within such units was 1/4, while all such installations were surveyed. Someone at a small camp (size-group III) and in a small unit would have exactly the same chance of being selected since, while all such units were selected, the individual sampling rate was 1/8, and the sampling rate for such installations was 1/4.

The key question in estimating the probability of bias from this source is whether or not the nonrespondents were different from those available. Were there any characteristics of the men, or of the circumstances in which they were living, which might have been related both to their food preferences and to their availability for the class sessions? This could easily be true. For example, one group of men likely to be unavailable for the questionnaire sessions would be those units most likely to be on maneuvers or training marches, which would include a higher proportion of the younger men with little service. Selecting substitutes for these men would not eliminate the possible bias caused by their absence unless the substitutes had exactly the same characteristics as the original group. The fact that it was impossible to have such assurance was another reason for not attempting replacement.

The population of interest in these surveys was previously defined as all Army enlisted men in the United States; however, it should be noted that certain groups or categories of individuals were excluded by the operation of the sampling plan, e.g., personnel on maneuvers or on detached service, personnel en route within the United States, personnel stationed at installations of less than 500 men, and a miscellaneous category including men on leave, in the hospital, or in disciplinary detention at the time of the survey.

SAMPLING DIFFICULTIES

Sampling within the Armed Forces is more difficult than sampling a stationary population. Continuous troop movement was one factor causing variation from the sample as originally planned. The expected numbers of respondents were based on the assigned strengths at the various installations. The information used to develop the detailed sampling plan was usually from two to four months old before a survey was completed, and the assigned strength at installations might have changed in the interim. Thus, the original estimates for specific installations would not necessarily correspond with the number of respondents obtained even if no personnel had been absent and the survey teams had carried out their work in exact accordance with instructions. To this must be added the more serious difficulty occasioned by particular troops being absent at the time of the survey, the reasons for which were discussed above. Men in these categories, even though assigned to the installation so that their number would contribute to the expected total, would not be on the morning report, and this would reduce the number of respondents actually selected.

The order of the discrepancies due to these two causes combined may be noted in Table 3.2 which gives the pertinent figures by installa-

tion for Surveys 1 and 5. The first columns designate the installation and the next three columns show, respectively, the number of respondents expected on the basis of the original detailed sampling plan, and the number and percentage actually selected. The percentages vary markedly among installations for both surveys. The over-all percentage of respondents selected was considerably higher for Survey 1--72.7 percent as compared to 62.9 percent for Survey 5. The explanation may be that the first survey was run in February 1950, but the fifth was run in September 1952, when the turnover of personnel was considerably higher due to the Korean action.

Another important aspect of the sampling plan was the extent to which the sampling quotas were filled. For most installations the number of respondents reporting to the class sessions and completing questionnaires was less than the number selected through application of the sampling process. The number and percentage actually reporting at each installation in Surveys 1 and 5 is shown in the last two columns of Table 3.2. In Survey 1 these percentages ranged from 88 percent to 100 percent, with an average of 94.1 percent. In Survey 5 the response was more variable, the percentages ranging from 67 percent to 124 percent, with an average of 92.6 percent. The average percentages of responses for Surveys 2, 3, and 4 (not shown in the tables) were 85.4 percent, 93.6 percent, and 92.7 percent, respectively. No explanation can be given for the marked drop in Survey 2. To some extent these figures probably indicate varying degrees of cooperation given the test teams at different times and at different installations. A certain number of "no-shows" would be inevitable, of course, due to the physical impossibility of having every last man in the right place at the right time. Twice in Survey 5 the number reporting exceeded the number selected. This excess was noted also in a few other cases, but too infrequently to have any real effect.

For Surveys 3, 4 and 5 two questionnaire forms were used, each of which included a different list of 54 foods. The two forms were to have been interspersed so that half of the men in each class session would complete one form and half the other. If the plan had operated perfectly, the number of questionnaires of each form from each installation would have been equal. That it failed in a certain number of cases was due to miscellaneous causes, not all of which could be identified. Table 3.3 shows the extent of discrepancy from the ideal 50-50 ratio between the two alternate forms.

TABLE 3.2

Comparison of numbers of respondents expected on the basis of the original sample, selected at time of surveying, and actually reporting by installation for Surveys 1 and 5.

Survey 1

Installation No.	Original sample	Selected at time of survey	Percent of original sample	Actually reporting	Percent of no. selected
1	400	204	51	192	94
2	550	328	60	309	94
3	100	93	93	92	99
4	75	49	65	45	92
5	600	498	83	494	99
6	450	331	74	320	97
7	450	402	89	382	95
8	850	620	73	586	95
9	325	248	76	227	92
10	650	409	63	384	94
11	75	75	100	75	100
12	350	268	68	256	96
13	250	149	60	146	98
14	600	309	53	277	90
15	550	445	81	421	95
16	400	327	79	327	100
17	800	596	75	524	88
18	275	247	90	247	100
19	400	290	73	262	90
20	450	461	102	409	89
21	250	89	36	87	98
TOTAL	8850	6438	72.7	6062	94.1

TABLE 3.2
"Continued"

Comparison of numbers of respondents expected on the basis of the original sample, selected at time of surveying, and actually reporting by installation for Surveys 1 and 5.

Survey 5

Installation No.	Original sample	Selected at time of survey	Percent of original sample	Actually reporting	Percent of no. selected
1	160	128	80	125	98
2	800	567	71	492	87
3	350	235	67	218	93
4	225	157	70	147	94
5	250	167	67	167	100
6	600	340	57	226	67
7	300	238	79	252	106
8	200	107	54	105	98
9	250	174	70	168	97
10	300	124	41	154	124
11	600	407	68	318	78
12	250	96	38	96	100
13	250	197	75	182	92
14	250	160	64	157	98
15	500	333	67	332	100
16	450	298	66	271	91
17	300	98	33	98	91
18	900	470	52	433	92
19	250	187	75	187	100
20	800	562	70	533	95
21	175	83	47	81	98
22	120	82	68	82	100
TOTAL	8280	5210	62.9	4824	92.6

EVALUATION OF THE SAMPLING PROCEDURE

This method of adjusting the sampling ratios has one disadvantage but also an important and very practical advantage. The average rating obtained from a sample selected in this way can be used without being further adjusted, as would have been necessary had the sampling ratios for individuals and units been the same for installations of all sizes. The disadvantage arises when any estimate of sampling error is attempted. Sampling error of the mean of a multi-stage sample must be built up from the variances within stages. Therefore, in order to estimate the variance of the means based on the present sample, information on the variances within sampling units would be required. This information was not available because of the way in which it was collected and reported. For example, respondents from several sampling units were often administered a questionnaire in a single session, or some of the respondents from a sampling unit would be included in one session and the remainder in another. There was no way of separating the questionnaires by sampling unit so that a rigorous error term could not be calculated.

Up to this point, the "survey" sampling error has been discussed as though there were the same amount of information for every food, but this clearly was not the case. Some individuals did not reply at all for some foods, and others indicated that they had not tried certain foods. Responses in these two categories have been treated in the same way, being regarded as nonresponses and omitted from the analysis. However, the degree of nonresponse was not the same for all classes or camps, even for a particular food. One source of such variation which can be identified is the distribution of respondents on certain background characteristics. For example, the frequency of nonresponse tends to be higher for men with less education.

POSSIBLE SOURCES OF BIAS

The sampling plan permitted no substitution for a selected unit or individual when that unit or individual was not available. This requirement was established as another safeguard against the introduction of bias. The problem of using substitutes has several facets. In certain types of surveys the replacement of nonrespondents can introduce a definite bias into the results since the characteristics of the replacements may be quite different from those of the respondents originally selected. Where bias because of nonresponse is anticipated, the only recourse is to obtain information about the nonrespondents by some alternate means, which may be tedious and expensive. Replacement by other respondents, randomly selected according to the original plan, will eliminate bias but will merely bring the number of respondents up to the planned level. If the interviewers in the field should tend to depart from the original plan in selecting replacements, more serious bias might be introduced. In the present case, it would have been impossible to reach the nonrespondents; and since the sample was already large enough, the extra labor that would have been required to select replacements randomly was not justified.

TABLE 3.3

Number of installations for which sampling ratio of two forms deviated from the expected 50-50 ratio

	Number of installations with given ratio		
	Survey 3	Survey 4	Survey 5
Ratio between Forms A and B			
50-50 to 45-55	16	13	15
44-56 to 40-60	0	4	2
39-61 to 35-65	2	1	2
34-66 to 30-70	2	1	2
29-71 or below	0	0	1
Total number of installations in survey	20	19	22

All of these variations from the sampling plan may have affected the randomness of the samples, but it appears unlikely that they will have resulted in serious bias. Although no analysis was attempted to determine the degree of the effects, it is reasonable to suppose that their importance will have varied with the size of the group under consideration; thus the effect on the mean ratings for the entire sample would have been negligible whereas the means for certain subgroups could have been displaced to a greater extent.

ADMINISTRATION OF THE SURVEYS

All surveys were conducted by the Field Evaluation Agency, Fort Lee, Va., an element of the Quartermaster Research and Engineering Command established specifically for field testing. It is staffed by both military and civilian personnel trained in methods for gathering information in the field. During the course of each survey, military test teams from this Agency visited each selected installation. They selected the specific sample, according to the sampling plan, and organized and conducted the class sessions. The teams usually consisted of one officer and one enlisted man. The Agency obtained advance clearances from the installation commander, arranged testing schedules, and supervised and coordinated the field work.

ORIENTATION

Prior to the first survey, a two-day orientation session was held at the Agency with Quartermaster Food and Container Institute technologists, Agency supervisory personnel, and the members of the original Agency test teams. The planned procedures were critically reviewed and adjusted in light of field experience. Then they were given trial runs.

New test teams members were trained by the Agency whenever this became necessary due to normal rotation of military assignments. The procedures remained essentially uniform throughout the eight surveys. As problems arose in the field they were resolved by the Agency itself or jointly with the Institute until the work flowed smoothly.

TESTING PROCEDURE

The first task of the team was to select the specific sample from the morning report. Schedules of classes were set up and the selected respondents notified when to report. In scheduling they attempted to avoid holding classes within one hour of mealtimes.

Each class session began with a brief orientation talk by a member of the test team. This was designed to enlist the men's interest and cooperation, and to allay any misgivings on the part of the occasional "test shy" individual. These points were emphasized: (a) the questionnaire was not an examination or "test" of any kind, (b) the respondent was in no way identified; hence, he could feel completely free to express adverse as well as favorable opinions without fear of reprisal, and (c) by answering honestly and carefully, he was helping the Army in its menu planning and therefore helping hemself to get better food. The general objectives of the survey program were explained and the organizations conducting it were identified.

After the questionnaires were passed out, the test monitor led the class in filling out the background information page, answering the men's questions as necessary. Next he read the instruction page (see Chapter 2), explained the examples, and again answered any questions. If the auxiliary part of the questionnaire, i.e., the pages relating to frequency of serving, preferred menu combinations, etc., required any special instructions, they were given at this time. Then the men were allowed to go ahead with the questionnaire on an individual basis, the test team members being available to help if necessary. Most sessions lasted from 20 to 30 minutes.

The test team completed two types of records. Sampling work sheets were prepared for each installation to show the units selected, the strength of each, the number of men present for duty, and the number selected in the sample. A class record sheet was prepared for each class which provided information on the number of men selected for the class, the number who appeared, the number of questionnaires completed, and the time of the class.

VARIATIONS IN TEST INSTRUCTIONS

A person may have different attitudes toward a given food arising from the variety of his past experience with it, and his response at any given time may depend upon some kind of variable personal weighing of these experiences. This inherent variability should be subject to some degree of control by the test instructions, but there was no methodical exploration of such possible control. However, it was recognized that there might be important differences between attitudes toward foods as prepared and served in the Army and attitudes developed in prior civilian life. In the first two surveys the respondents were instruct-

ed to rate the foods in accordance with their Army experience, and to indicate "not tried" if they had not tried the food while in the Service. This instruction was omitted after Survey 2 because of the influx of a large number of men who had just entered the Army due to the Korean war and hence who would have lacked experience with a large proportion of the foods as served in the Army. The instruction was changed back to foods as known in the Army for Surveys 7 and 8 because of the soluble coffee study which was designed to measure preference for soluble coffee as it was served in the Army.

Chapter 4

QUANTIFICATION OF PREFERENCE RATINGS

Even before data from the main surveys were available and while the questionnaire was being developed, it was anticipated that the mean rating, which is obtained when integral values from 1 to 9 are assigned to the scale points, would be the most useful way to represent preference. The surveys were planned with this in mind. Subsequent analyses have indicated other possible ways to represent the data. This chapter is devoted to a brief review of these other possibilities, along with inquiry into the nature and general characteristics of the data.

CHARACTERISTICS OF THE SCALE

It is assumed that the respondent grasps the idea of the scale and relates it to his own subjective continuum of liking and disliking of foods. The physical arrangement of the scale is designed to transmit the idea of successive degrees of both **like** and **dislike** which is reinforced by the specific verbal descriptions. Obvious errors were regularly found in the completed questionnaire, but their proportion was small. Furthermore, the reliability of the results (see Chapter 5) and their validity (see Chapter 6) attest to the fact that the scale was understood. Jones and Thurstone[7] have verified that the present hedonic scale fulfills one important requirement in that it provides a continuum along which the categories represent successive increments. A large group of soldiers rated about 50 words or phrases that might reasonably be used to describe feelings about foods, assigning them to positions on a scale ranging from "greatest dislike" to "greatest like." The average values of the phrases used in the present scale covered a wide range and all fell into their proper successive positions. However, no exact or invariant meaning need be ascribed to any individual response, i.e., strict comparability of responses among individuals is unnecessary and need not be assumed. The objective is to establish relative preference, and this can be accomplished for the group even though the individuals have different specific levels of responding, as long as they understand the bipolar, continuous nature of the scale.

The problems of psychological scaling are many and complex, and the difficulties mentioned here beset any investigation dependent upon such techniques. The present research was not directed toward the solution of these problems; the objective was to develop a practicable, working system. The rating scale or other measuring device used in any survey, along with the entire survey methodology, usually must find its verification, very practically, in terms of the results obtained. That the scale categories are meaningful and related is shown by inspection of the complete distributions, which tend to vary in characteristic ways which will be discussed later (see Figure 4.1). Many possible ways in which they might be analyzed or integrated into a simpler form are readily apparent. Percentages of responses in single categories, or percentages in different combinations of categories, could be used as indices of preference to make comparisons between foods or between groups of respondents.

Reliance on the original categorical data, either the full distributions or frequencies of response in various combinations of categories, would require few assumptions; however, there would be many disadvantages. The basic preference results would be much more cumbersome to report and discuss than if a single index were used. Further analysis would be complicated and the types of analysis that could be undertaken would be severely limited. The fact that the variance of such data cannot be accurately determined would be another major difficulty. Moreover, the preference indices that might be taken directly from the distributions, e.g., the total percent **dislikes**, is not as statistically powerful as the average rating, since the direct indices would require discarding part of the data.

Parametric statistics simplify the analytical task, but whether or not they are appropriate for these survey data had to be considered. The present data are categorical, but they are also ordered. Thus they meet one of the indispensable requirements for the use of parametric statistics. Stevens[12] classifies scales of the type used here as "ordinal" and indicates that, from the standpoint of the statistical purist, all they can be used for is to arrange stimuli in rank order. In that case, means, variances, and all other statistics dependent upon them would not be theoretically justified. However, most investigators are willing to disregard the minor theoretical difficulties to gain the practical advantages of these statistics, even though the intervals of the scale may not be equal, which is the major objection.

SCALE TRANSFORMATIONS

There are various transformations that might be used to equalize the scale intervals; however, all were rejected for either theoretical or practical reasons. The fact that all would have involved additional computational labor was a deterrent to their use, although this factor alone would not have eliminated them had there not been other disadvantages.

A rectangular transformation is based upon the assumption that the frequency of use of the various categories should be equal, but they are not used equally often because the preselected, fixed scale points are not really equidistant. This transformation did not appear even theoretically suitable for the present data since the validity of the basic assumption was questionable.

A normalizing transformation assumes that the **true** distribution of preferences for any food is normal but may be obscured by the varying widths of the scales intervals. This assumption has been verified by Edwards[1], and the process of transforming the scale into normalized form has been described[5]. The major obstacle to the use of this method was that the transformation would have to be computed separately for each questionnaire form because different food lists were involved and these foods were not selected randomly. For example, the first survey was purposefully directed toward "suspect" foods and included a high proportion of low preference items. Use of the normalizing transformation would have made it difficult validly to compare foods from survey to survey.

Standard scores would represent another possible type of transformation. They would be derived for each respondent separately by converting the numerical value of his rating for each food into a standard deviation distance above or below the average of all of his ratings. This device is subject to the same major objection as the normalizing transformation; namely, that such scores would have to be developed for each questionnaire separately and would be closely dependent upon the foods included.

To take full advantage of any one of these interval-equalizing transformations, it would have been necessary to include all foods in a single questionnaire, but this was impossible due to the large number of foods to be studied. It was therefore decided to assign integral values to the scale categories, even though this required acceptance of the questionable assumption of equal intervals. Once this assumption was made, however, the data could be handled by the usual parametric statistics. Probably the most serious defect is the fact that the variance is correlated with the mean, the order of the correlation being about —.90 (eta, the coefficient of curvilinear correlation, for a random sample of foods, was even higher, —.98). This correlation reduces the accuracy of any prediction equations that may be developed, and it is likely that one cannot, with full confidence, interpret levels of statistical significance in the usual way.

An effect, which arises from the use of untransformed or unscaled data, is the truncation of the distributions of responses on many foods apparently due to the fact that the scale is too short to allow for full expression of the respondents' attitudes. This is quite evident with many of the well-liked foods. Figure 4.1a shows the percentage of responses in each category of the scale for 14 high preference foods where it may be noted that **like extremely** is the modal response. That the same effect may be present with slightly less well-liked foods is indicated in Figure 4.1b. There is also a suggestion of truncation at the **dislike** end of the scale, (Figure 4.1e), but here it appears much less marked, since comparatively few intensely disliked foods were included in the surveys.

RELATION BETWEEN MEAN RATING AND FREQUENCY DISTRIBUTION

The relative frequencies with which the various categories of the scale are used are related in a fairly orderly manner to the mean rating of the food under consideration. These relationships are shown separately for five groups of foods in Figures 4.1a through 4.1e which show the percentage of ratings in each scale category for foods grouped by mean preference ratings. The foods were selected so that their means would fall within five sharply limited ranges, each range at a different level on the scale. The percentage of responses within each scale category is plotted for each of the foods in the group. The average percentages are indicated and connected by lines. In effect, this sketches a "typical" distribution for each group of foods. The amount of scatter of the points around the average indicates how typical the distribution is.

The shape of the distributions changes considerably as the means vary from the high to the low end of the scale, but the changes are progressive. Selection of these particular ranges for presentation, of course, does not imply that they are unique, or that all foods could be classified into one of these groups. The selection of these groups was arbi-

trary, and the resulting distributions are no more important than any other set that might be established in the same way. It is apparent, however, that plotting data for other groups of foods would result in patterns quite similar to those shown and would demonstrate the same orderly changes in pattern.

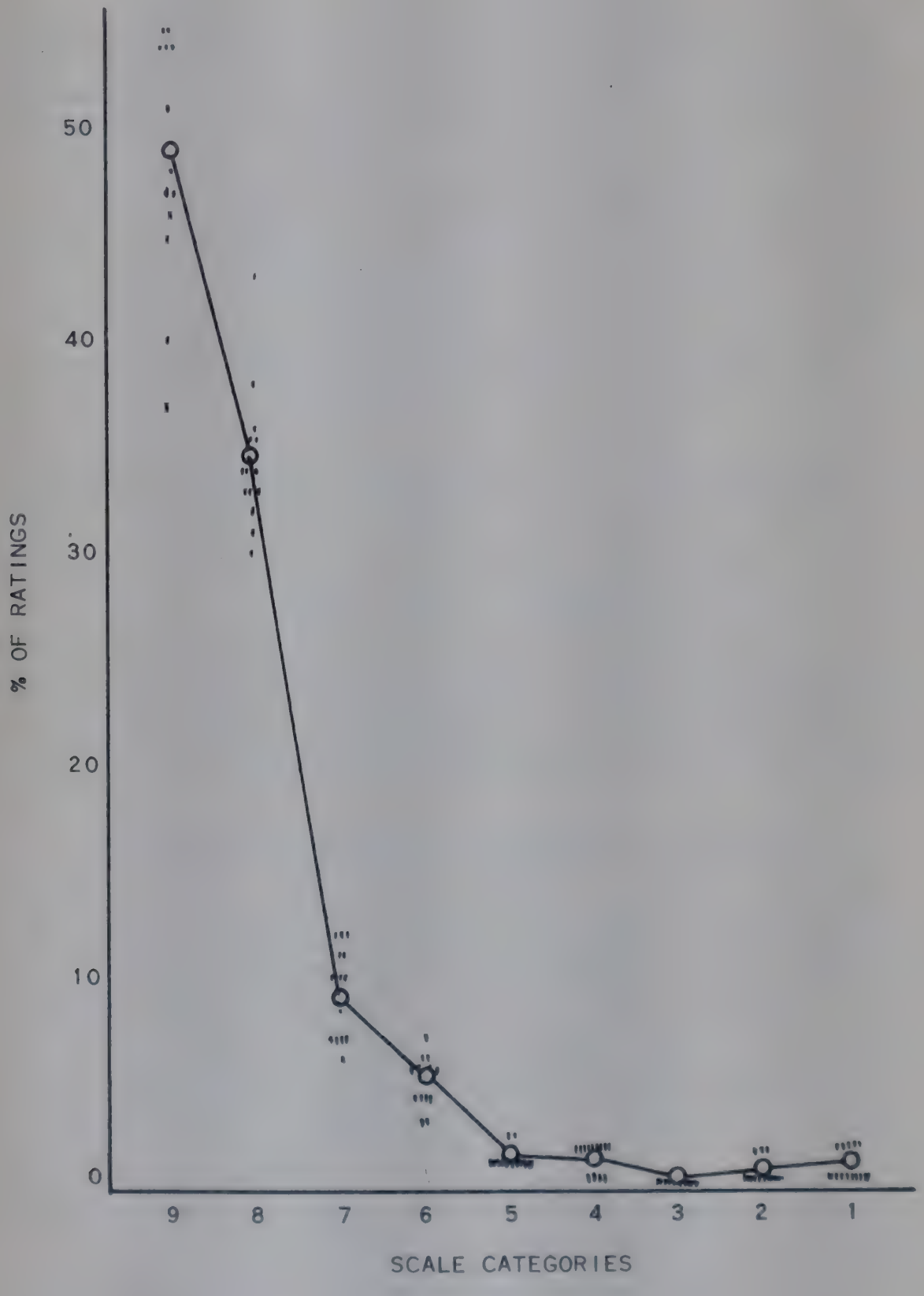

FIGURE 4.1a

Foods with mean range of 8.40-8.00 (N = 14).

Figure 4.1a includes 14 of the 15 foods which were best liked of all of those surveyed. The distribution for fresh milk, the best liked food included in the surveys, with a mean rating of 8.60, is so markedly different from the others that it seems to belong in a class by itself, hence its data were not used in constructing the chart. **Like extremely** is the modal category for all but one of the foods included in this group, and all of the percentages below **like moderately** are negligible.

The mode of the next group (Figure 4.1b) which includes foods with means falling in the range of 7.15 - 7.35, is in the **like very much** category. Here there is considerable use of all four **like** categories, with the sharp break-off at the neutral point, **neither like nor dislike.** For foods in the range 6.40 - 6.60 (Figure 4.1c), the distribution begins to flatten. Most of the responses are still in the four **like** categories but there is no clearly defined mode. There is a sharp drop in frequency at **neither like or dislike,** but the percentages in the **dislike** region have

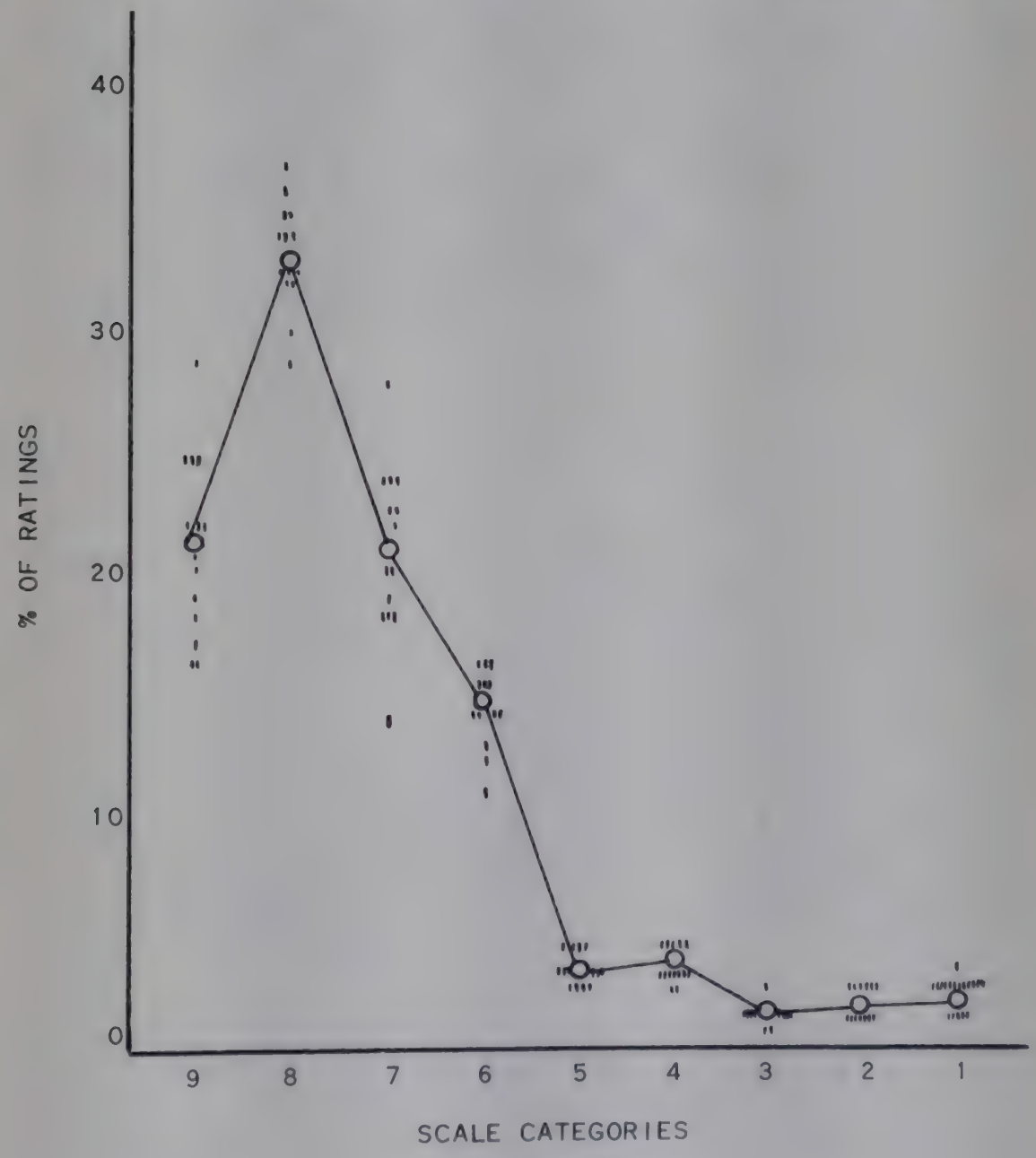

FIGURE 4.1b

Foods with mean range of 7.35-7.15 (N = 14).

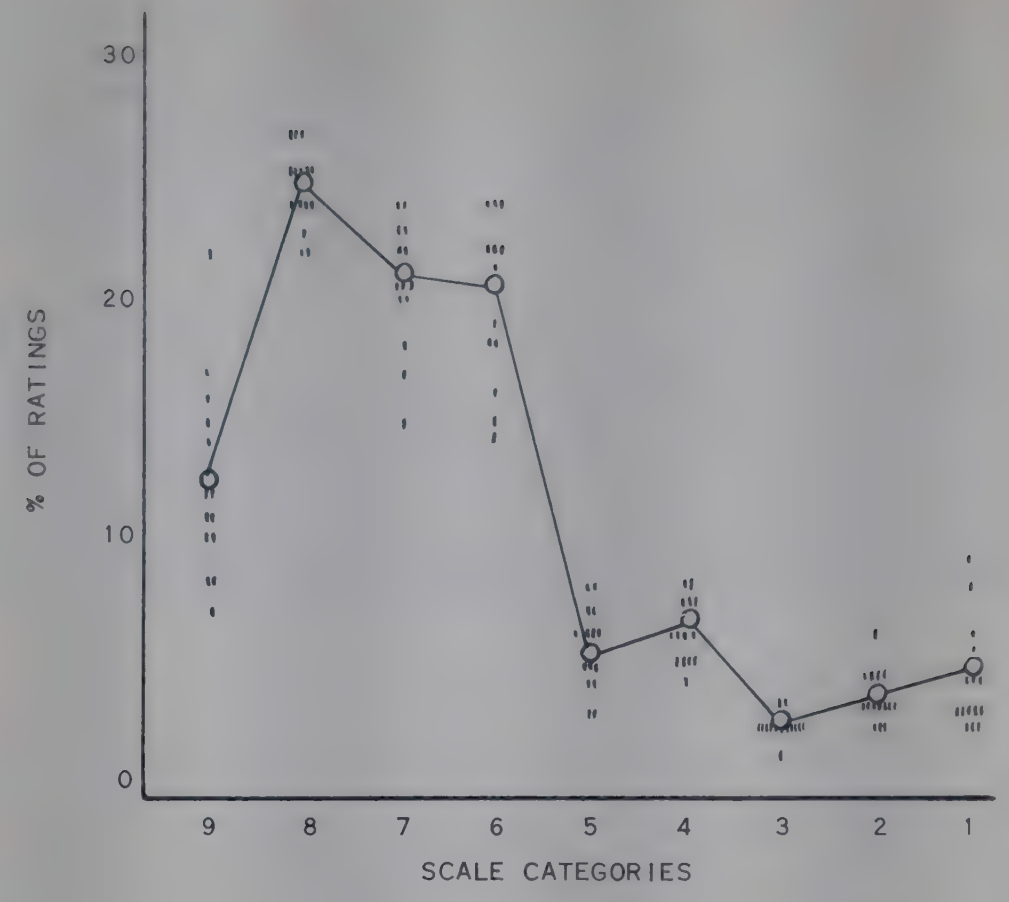

FIGURE 4.1c

Foods with mean range of 6.60-6.40 (N = 15).

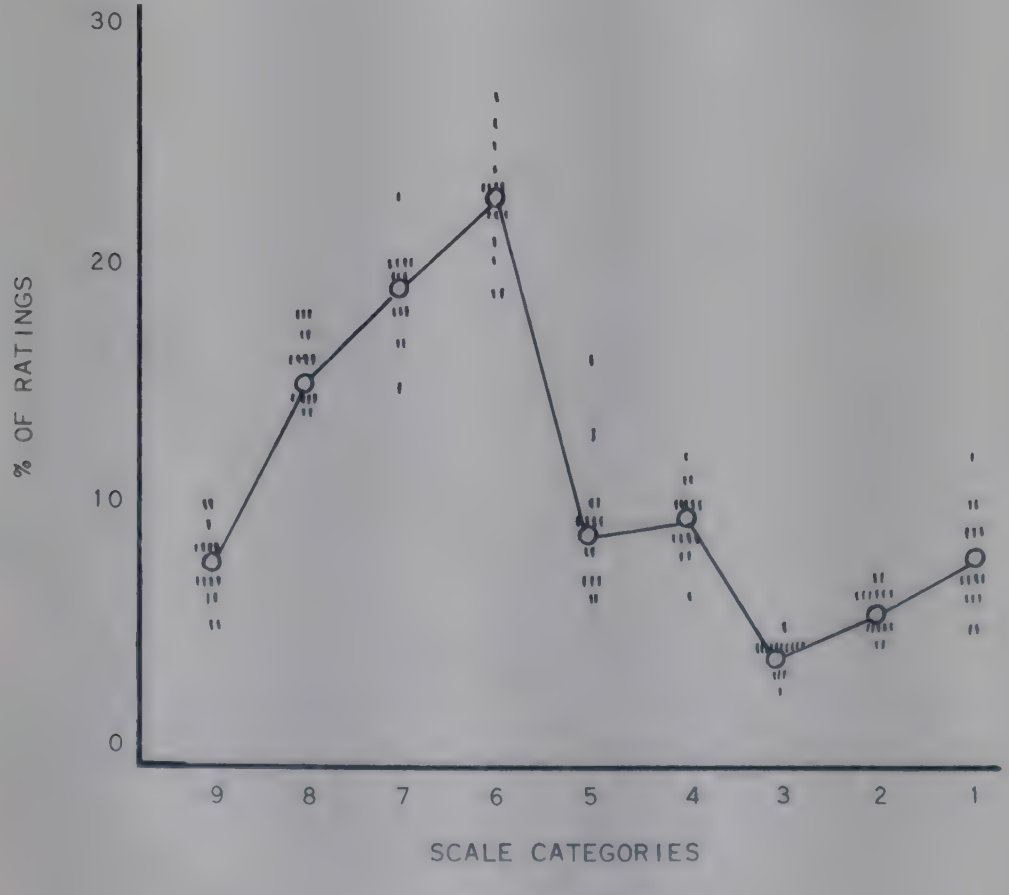

FIGURE 4.1d

Foods with mean range of 5.90-5.56 (N = 15).

begun to increase. The foods plotted in Figure 4.1d have relatively low preference, with mean ratings in the range, 5.56 - 5.90. The mode is still in the **like** region, at **like slightly,** but the lower preference categories are becoming more important.

Figure 4.1e includes the 16 least liked foods, with mean ratings in the range, 4.06 - 5.00. This distribution is definitely bimodal with one mode at **like slightly** and the other at **dislike extremely.** The distribution is much flatter and the scatter of the points around the averages tends to be greater. This is a graphic demonstration of the fact that the variance of the survey data is negatively correlated with the mean rating.

An interesting point may be verified by inspecting these five figures. Foods which on the average are very well liked achieve that status because they are disliked by practically no one. They are popular in the real sense. Disliked foods, on the other hand, are not relegated to a low status because everybody dislikes them. Even the foods with the lowest average preference have their protagonists, as evidenced by the 5 percent of **like extremely** responses in Figure 4.1e. The possibility of using the total percentage of **dislikes** as the preference index was considered because there is a close relationship between the total percentage **dislikes** and the mean rating (Figure 4.2). They correlate about -.95, although the relation is not linear throughout, but tends to curve at the high preference end of the scale. Consequently, this **percent dislike** index does not discriminate between foods that rate above 7.00 as well as does the mean rating.

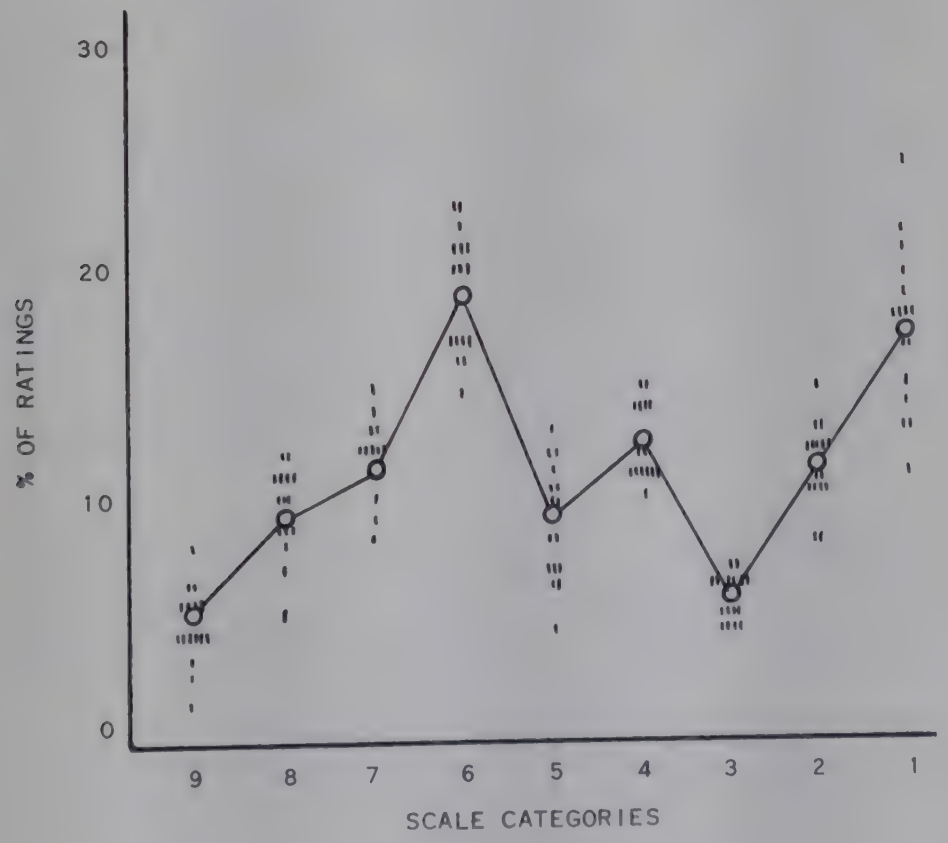

FIGURE 4.1e

Foods with mean range of 5.00-4.06 (N = 16).

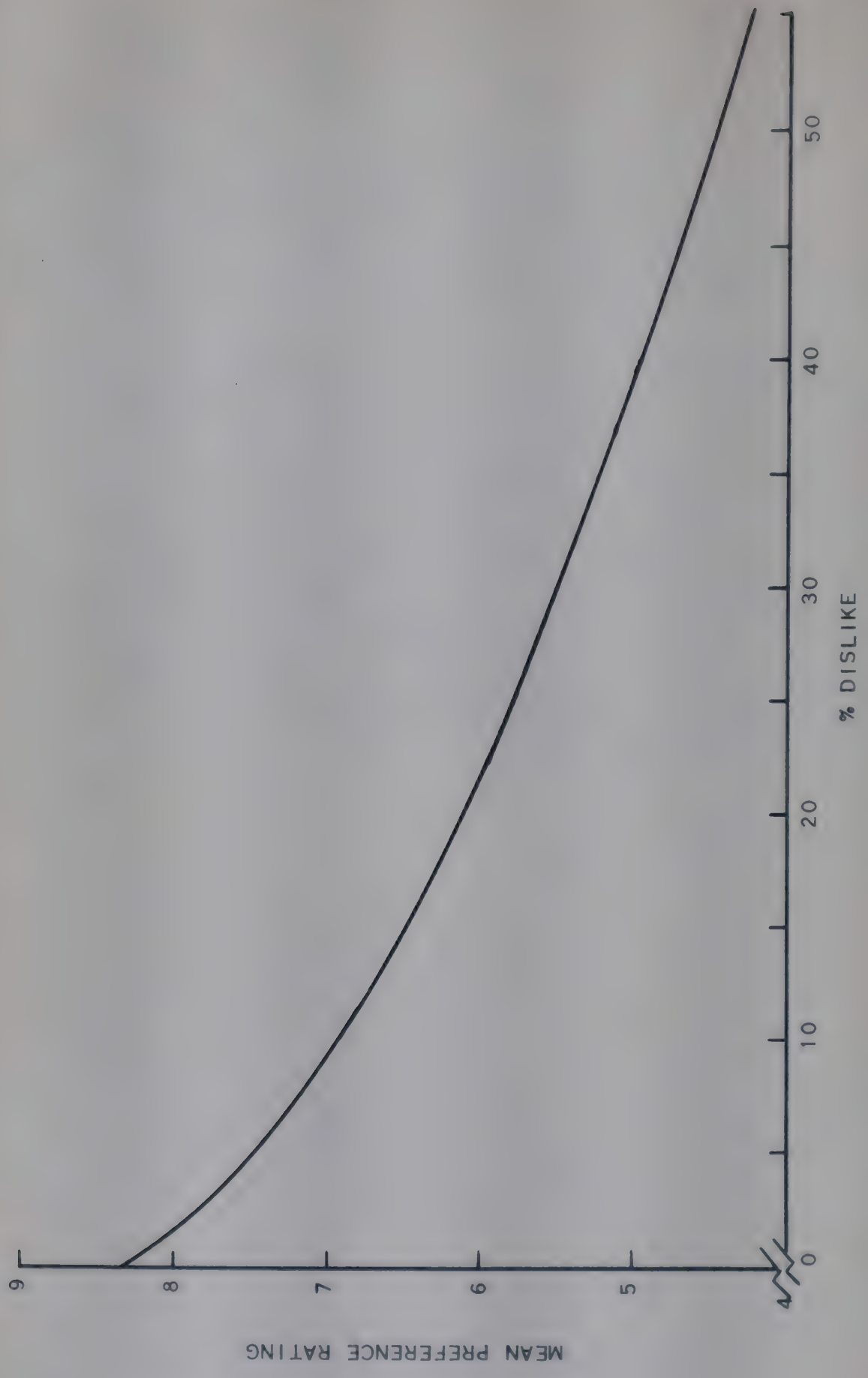

FIGURE 4.2

Relationship between mean rating and percent dislike (categories 1 to 4 combined).

Another point is demonstrated in Figure 4.1: percentages of responses in the category, **dislike moderately,** always tend to be lower than the adjacent categories, indicating an avoidance of this response. In a word-meaning study, Jones and Thurstone[7] found that there was some confusion among their soldier subjects about the meaning of this phrase. Some placed it in its proper relationship to the other terms, but a large group rated it on the **like** side of the scale. This was believed to be related to the colloquial use of "moderate" as an expression of mild appreciation in the sense of "good" or "favorable." Thus, a contradiction would arise for some people when the word was joined with "dislike" and they would resolve the conflict by avoiding the category.

SCALE AS PAIRED COMPARISON

Another way to look at the preference scale is as a means whereby the respondent indicates his preference between all possible pairs of items in the food list. For any given pair of items included in the same questionnaire, we can determine the frequency with which each of the two is rated higher than the other as well as the frequency with which they are rated the same. Then, it is not necessary to make any assumptions about the size of the scale intervals; but, granted that the respondents can discriminate more than two levels of preference, most of the power of the scale is lost. However, this paired comparison analysis enables us to make certain interpretations that are plausible. For example, the hypothesis may be advanced that the percentage of individuals placing one member of a pair of foods in a higher preference category than the other represents the frequency with which the better rated food would be chosen if the two were placed in direct competition. Estimates of this kind cannot be obtained directly from the two mean ratings.

Percentages were tabulated for 227 pairs of foods, including 51 in the main-dish category, 65 vegetables, 90 desserts, and 21 salads. Results are presented graphically in Figure 4.3, which shows the percentage of respondents who placed the preferred food in a higher preference category, the percentage who rated the two foods the same, and the percentage who placed the preferred food in a lower preference category. Percentages are shown as a function of the amount of difference between the mean ratings of the two foods. The three curves are complementary since the three percentages for a given pair must total 100 percent.

The four food groups have been combined in these charts. Initially they were done separately to check on the possibility that the manner of using the scale might depend on the type of food being rated. Since the plots were almost identical for the percentage rating the preferred food better, no distinctions were made among these food groups. However, certain differences did appear in the other two plots. Compared to the other groups, vegetables showed a tendency toward higher percentages rating preferred food worse and compensatory lower percentages rating it the same. Desserts had an opposite trend, with higher percentages rating the preferred food the same as the other and lower percentages rating it worse. Evidently there is less agreement within the population about vegetables and more agreement about desserts than about most foods. This is shown also by the fact that the vegetable

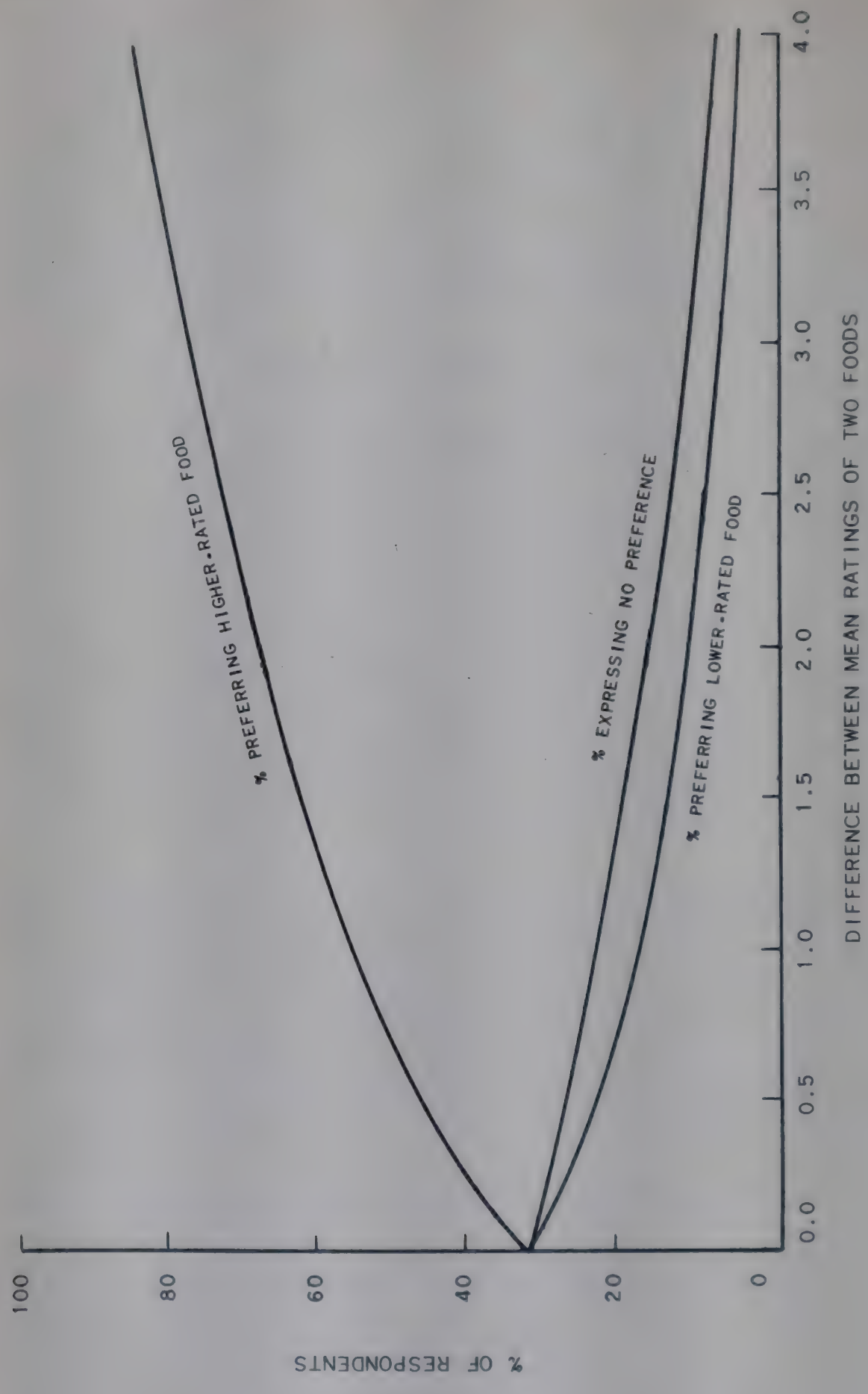

FIGURE 4.3

Relation between indicated preference and amount of difference between mean ratings of two foods--based on 237 pairs of foods.

items have generally larger variances, although as suggested above, this may be no more than an artifact of the scale, because vegetables are low in preference while desserts are high, and the variance and mean are highly correlated. In the chart, a vegetable pair and a dessert pair may have the same abscissa value, indicating that the difference between the members of the pair was the same in both cases, even though the levels of preference were quite different. Therefore the effect may be related not to types of food, but to the level of rating of foods regardless of type.

These relationships might be used to "interpret" the mean scale ratings. For example, if the difference in rating between two foods were 0.4, referring to Figure 4.3, one would predict that in a competitive situation about 40 percent of the population would choose the food with the better mean rating. Prediction of the behavior of the remaining 60 percent of the population would be less accurate because of the wide scatter of points about the other two lines. Reading from the center of the distribution of points of an abscissa value of 0.4, one sees that about 35 percent would have rated the two foods the same. Presumably, this group would divide its choices between the two foods, so that a total of about 58 percent of the population would choose the food which was generally preferred. The remaining 42 percent would choose the less preferred food, 25 percent because they actually preferred it, and the rest because they had no preference. Applying the same procedure for pairs of foods showing a 1.0 scale point difference would give an estimate of 67 percent of choices for the preferred food (55% + 12%). The basis for such estimates is reasonable and logical, but it must be remembered that they have not been validated.

THE MEAN RATING

The foregoing discusses what could have been done. Actually, experience with the 9-category hedonic scale[8] has shown that the assignment of successive integers to the categories is generally adequate, and none of the alternative methods seemed to offer any advantages that were not outweighed by disadvantages. Therefore, the main analysis of the data was based on mean ratings obtained by assigning integers to the categories. All subsequent discussions, where not otherwise specified, will refer to this measure.

In order to maintain the convention of equating high preference with high ratings, the scale categories have been numbered from **1** for **dislike extremely** through **9** for **like extremely.**

Chapter 5

REPRODUCIBILITY OF PREFERENCES

If a set of measurements is to represent something more than a unique situation existing at a given time, the measurements must be reproducible to some extent; otherwise no generalization is possible. The degree of reproducibility required may vary, depending on the intended use of the results. Do we need to predict only from Monday to Tuesday, or do we want to predict from 1950 to 1960? Over what range of situations and for how large and varied a population do we want to predict?

Questions of reliability become particularly important with survey results. Survey studies may be contrasted with the typical laboratory experiment. The latter is designed within a limited scope, the variables of interest are preselected and held within known ranges, and strong emphasis is placed on control of irrelevant variation. It is easier both to reproduce results and to determine when lack of reproducibility is due to a change in experimental conditions; but in surveys we no longer have a constant experimental world. Instead, we are trying to describe a situation which we cannot manipulate---we must accept it as is. If results are not reproduced, we may never know whether it is due to unreliability of the method or to some real change in the food, in the field conditions, or in the population. Variability in food preferences, as in any other kind of measure, may be due to multiple factors that cannot be specifically identified.

VARIABILITY WITHIN A SURVEY

A certain amount of variability is always inherent in the phenomena being measured and in the method of measurement. Even under optimum conditions, this limits the precision with which results can be reproduced. Several points of particular importance in measuring food preferences may be noted. First, it is recognized that people's attitudes toward foods are subject to a certain amount of variation over time; also, understanding and use of the scale may vary. Presumably such changes will average out when we are dealing with group preferences. Second, and more important, there are major differences among individuals in their true level of preference, and in the way they use the rating method, which result in rather broad distributions of preference ratings for many foods. Further, any given survey was conducted at different times, in different places, and by different test teams, and it may be assumed that these factors could affect the results.

An estimate of the variability of the survey means arising from all of these sources combined may be obtained from the standard error of the mean. The standard deviation varied among foods and the number of respondents varied among surveys, but if we use an estimated median standard deviation of about 2.00 and the minimum **N** of 2,000, we obtain a value which is generally representative:

$$SE_{\bar{x}} = \frac{2.00}{\sqrt{2000}} = .045$$

This assumes that the survey respondents were a random sample of the population, which is not strictly true; however, such lack of randomness is not important because the above value was not used in making actual estimates of reliability.

This value reflects only within-survey error, and predicts what should happen in future surveys run under identical conditions and using random samples of respondents from the same population. If a mean preference rating obtained in a later survey were found to vary outside the predicted range, it might indicate a real change; however, the nature of the change could not necessarily be determined. The population may have changed, or something may have happened between surveys, such as alterations in the menu patterns or changes in the quality of the items as served during the interim period, which had brought about a real change in the soldiers' attitudes toward the food. In both cases, the fact that a change had occurred would be important and useful information, unless such changes occurred so often that there was no means of adjusting to them. However, variation beyond the predicted range could also be due to lack of control in sampling, to faulty survey techniques, or to real changes in unknown factors. From the practical standpoint, variation of this type has to be treated as random error, since it is necessary to develop stable predictions that can be generalized to the entire Army population over a reasonable length of time. For this reason, the within-survey error, estimated from the standard error of the mean, was not used as a guide in interpretation.

VARIABILITY AMONG SURVEYS

As a planned check on reproducibility, five foods, selected so that their mean ratings would cover a considerable range, were included in all eight surveys. The variation among the 40 means can be attributed to three main sources: intrinsic and systematic differences among the five foods, systematic differences in general level of rating from survey to survey, and the interaction of these two types of differences. The last two sources of variation may be considered as "error" because they account for all differences between ratings except for the differences due to the foods themselves. Using this type of error, one can estimate the extent of discrepancy between the mean rating of a food in any one survey and its mean rating in any other survey. To derive this estimate of error, an analysis of variance of the 40 means for the "repeat" foods was performed (Table 5.1). The sum of the squared deviations due to differences between surveys and the food-survey interaction were pooled. Dividing by the appropriate degrees of freedom gave a standard error of 0.20. This figure is based empirically on what actually happened when surveys were repeated, and, if these five foods are typical, it is an estimate of the amount of error which should be anticipated for foods in general.

Further evidence of test-retest reliability, based on more foods, is available from comparison of Surveys 6 and 7, each of which repeated a number of foods that had been surveyed earlier in addition to the five that were included in all surveys, and from comparison of Surveys 7 and 8 which used identical food lists. The distributions of actual differences between the mean ratings for identical foods are given in Table 5.2. The five "repeat" foods were omitted from the "Survey 6 **vs.** previous" and "Survey 7 **vs.** previous" distributions because it would have

TABLE 5.1

Analysis of variance of mean ratings of five repeat foods in eight surveys

Source of variation	*df*	Sum of squared deviations	Mean square
Foods	4	85.59	21.40
Surveys	7	.33	.05
Food X survey	28	1.07	.04
Total	39	86.99	

$$SE = \sqrt{\frac{.33 + 1.07}{7 + 28}} = 0.20$$

been necessary arbitrarily to choose just one of several previous ratings to represent each. The same problem did not arise in the comparison of Surveys 7 and 8. Here they were included in both forms of the questionnaire. Coffee and soluble coffee were excluded from this comparison because of the special condition represented by the use of soluble coffee at some posts during the period between surveys.

Inspection of the values in Table 5.2 indicates that reproducibility is generally good. The mode of the 190 differences is below 0.10 of a

TABLE 5.2

Number of foods showing various amounts of difference between mean ratings in two different surveys

Amount of Difference	Surveys				
	6 vs. previous	7 vs. previous	7 vs. 8 Form A	7 vs. 8 Form B	Total
.00 - .09	25	13	8	19	65
.10 - .19	17	5	20	12	54
.20 - .29	9	6	7	8	30
.30 - .39	8	2	6	3	19
.40 - .49	6	6	3	2	17
.50 - .59	1	1			2
.60 - .69		1			1
.70 - .79		1			1
.80 - above	1				1
Total	67	35	44	44	190
Average difference	.19	.23	.20	.15	.19

scale point, the average is 0.19, and only five are over 0.50. An analysis of variance comparable to that shown in Table 5.1 was performed for each of the four comparisons among surveys shown in Table 5.2. The standard errors derived from these analyses are shown in the right-hand column Table 5.3. As was to be expected, the values are essentially the same as the average differences shown in Table 5.2.

The standard errors obtained from the "Survey 7 **vs.** Survey 8" data are lower than the others, which we may suppose is related to the closer comparability between the two. Surveys 7 and 8 were run within six months of each other, so that the composition of the Army, food service, morale, etc., would have changed little. Use of the same questionnaire meant that any possible effect of order of foods in the list would be absent, and there were but few changes in the personnel of the survey teams. The other sets, i.e., "Survey 6 **vs.** previous" and "Survey 7 **vs.** previous," consist of pairs of ratings obtained from one to five years apart, with different questionnaire forms and different survey teams.

These four standard errors average to about the same value as the error derived from the five repeat foods. This result indicates that the five repeat foods were typical of the foods in general. In addition to the small basic within-survey error, these standard errors reflect variation due to real changes in food attitudes, e.g., those due to changes in the population itself, in the men's way of life, in menu patterns, or the quality of the food served during the interim period. They also include variation arising from the survey methodology, such as lack of control in sampling or variable skills of the survey teams. If we want to generalize to the entire Army population and over a reasonable length of

TABLE 5.3

Correlation of mean ratings for various sets of foods included in two surveys and standard errors obtained by analysis of variance

Surveys	Number of foods	Correlation[a]	SE_{est}[b]	SE[c]
6 and previous	67	.96	.27	.19
7 and previous	35	.95	.30	.23
7 and 8 (Form A)	44	.98	.17	.16
7 and 8 (Form B)	44	.99	.15	.14
Mid-point range			.21	.18

[a] The five "repeat" foods were included in the two correlations of S7 with S8 but were not included in the other two correlations.

[b] Standard error of estimate of a mean rating predicted from the correlation.

[c] Obtained from analysis of variance in which the total variance attributable to survey and food-survey interaction was divided by the sum of their degrees of freedom and the square root obtained.

time, we must consider all of these sources of error together. Even though we may have reason to believe that the major part of the overall variability arises from real changes in preference, for the purposes of general prediction for the Army population it must all be treated as error.

CORRELATION BETWEEN SURVEYS

Another measure of the reliability of the results is provided by the correlations between mean ratings for foods repeated in two surveys. Table 5.3 gives the correlations for the four sets of paired ratings already discussed. They ranged from +.95 to +.99. The relative order of preference was reproduced almost perfectly between the more closely associated Survey 7 and Survey 8, and the agreement was almost as good with the other sets where the intervals between surveys were longer. The standard errors of estimate are another indication of the precision of measurement and agree fairly closely with the values obtained by analysis of variance. We should expect as much because, even though the two analyses were different, they made use of the same data.

The function proposed in this report for the various measures of error that have been discussed is to provide guidance as to the amount of scale difference which should be considered important. If there were not a fair amount of agreement, this objective would be difficult to reach.

DIFFERENCES AMONG POPULATIONS

It is assumed that part of the between-survey differences is due to the fact that the populations sampled differed in some important characteristics. For example, information obtained on the background characteristics of the Army respondents showed that after Survey 2, which was run just before the Korean war started, the "average Army enlisted man" was younger and had more education than those in Surveys 1 and 2. Other analyses have shown that age and education affect preferences for some foods.

Evidence relating to the effect of population differences on reproducibility of ratings is available from comparison of Survey 8 results between the Navy and the Army. Because of the Navy's particular interest in the soluble coffee problem, this survey was extended to include a selected sample of 2400 Navy men from various ships and stations. The average of the differences between the Army and Navy mean ratings for a given food, without regard to the direction of the difference, was 0.38 scale points. Most of this was accounted for in that the difference between the grand means for all foods was 0.30, the Navy men rating lower. However, the correlation between the means across the 88 foods was + .95, which indicates that the order of relative preference for the Navy men could be predicted accurately from the Army ratings in spite of the constant difference in level of rating.

VARIABILITY WITHIN BACKGROUND SUBGROUPS

Estimating the reliability of mean preference ratings for subgroups derived by breaking down the data according to background character-

istics represented a special problem, largely because the **N**'s are much smaller. Often the subgroup **N**'s are 100 or fewer as compared to the 2000 or more respondents on which the survey means are based. For this reason alone, it is possible for the standard error of each category mean to be as much as 4.5 times as large as that of a grand mean of all subgroups.

On the other hand, inspection of the subgroup means for many foods indicates that preference often increases or decreases consistently with increasing values of the background factor; such trends are apparent with age, education, length of service, and size of town. If for any food a trend is real, then the differences in means between subgroups account for a significant proportion of the total variation among individuals for that food. Consequently, the within subgroup variation--the error term--is reduced; and, if differences between the subgroup means are large enough, the standard error of a subgroup mean could even be smaller than the standard error of the mean of the entire group.

A rigorous approach to determining the significance of the differences among subgroup means would be to perform an analysis of variance for each of the 377 foods on each of the five background factors. The consistency of any differences could be tested for those items appearing in two or more surveys by including survey as another variable in the analysis; a significant category-survey interaction would be interpreted to mean that the category differences are at least partly dependent upon the particular survey.

The computational costs of this method (nearly 2000 separate analyses) did not seem to be justified by the increment in information that would be obtained. What appeared to be needed instead was a general and simple method to identify the more important background effects, and one that would be applicable over all background factors.

Three courses were followed in deriving such a general error term. The first is comparable to the one used in arriving at the general standard error of any mean within any survey. The error term was computed by using the estimated average standard deviation for all foods of 2.00 scale points and a minimum value for **N** of 100. By this method, the standard error of an average category mean is estimated to be .20 scale points.

A second way of estimating a general error term was developed from the data on the five "repeat" foods from the first five surveys, for which preference means had been tabulated for each category of the five main background factors. The differences between the category means from each of the five surveys are in part due to differences in general levels of ratings from survey to survey and in part are due to actual differences in preference between background categories. The variation remaining after these two sources of variation have been considered can be attributed to error. A direct estimate of this error was obtained by performing an analysis of variance for each background characteristic separately, omitting those categories that had an **N** of less than 50. The variation among background category means was analyzed as a function of surveys, background categories, and interaction of surveys with categories. The square root of the interaction mean square is the standard error of a category mean and represents the

variation among means that cannot be accounted for by differences between surveys or differences between background categories.

The standard errors obtained by this method are summarized in Table 5.4. Inspection of the values in this table indicate that the magnitude of the error is partly a function of the food--the lower the preference the higher the error--and partly a function of the background characteristic--size of town and education have the lowest errors. The standard error derived from the average variance is approximately .14. It is, therefore, comparable to the error estimated from the average standard deviation, assuming an **N** of 100.

A third method was a substitute for the analysis of variance of all 377 foods on each background factor which was discussed above and rejected as a very time-consuming process. Instead of analyzing the 1885 sets of means, a random sample of 40 sets was chosen. It was assumed that for each of the background factors, except region, there would be a lawful relationship among the categories because they lie on a continuum represented by the successive categories of response (see Figures 2.6 and 2.7). First, it was assumed that the relationship would contain a linear component, that is, preference would generally increase or decrease as **age, education, length of service** or **size of town** increased. Second, it was assumed that some curvature could occur either because preference leveled off at one end or the other of the continuum or because the categories are not equal but tend to increase or decrease in size along the continuum. The latter effect is well illustrated by length of service in which the first category is only two months long and successive categories progressively increase. Such effects can be detected by the quadratic or parabolic component. Third, it was assumed that any higher order effects, such as a cubic curve having a point of inflection, were the result of error.

TABLE 5.4

Standard errors of background category means according to food and background characteristic

	Background Characteristic					
Food	Age	Education	Length of service	Size of town	Area	Average
Fresh sliced tomatoes	.11	.08	.09	.05	.10	.09
Spaghetti and meatballs	.11	.09	.16	.08	.10	.11
Bread pudding	.13	.13	.18	.13	.19	.15
Buttered turnips	.18	.14	.14	.18	.14	.16
Iced coffee	.21	.18	.14	.15	.22	.18
Average	.15	.13	.14	.13	.16	.14

Then, to each set of means, the linear and quadratic polynomials were applied to obtain the sum of squared deviations due to each of these components. These effects were subtracted from the total sum of squared deviations, and the residual was taken as error. This computation was made for all 40 food-background sets of means, eliminating, however, any mean that had an **N** of less than 50. To obtain a common error term, the residuals and their degrees of freedom were pooled. Since each food-background category contained from four to eight means, removal of the linear and quadratic effects left from one to five degrees of freedom for error, yielding a total of 119 error degrees of freedom. The residual variation gave a mean square error of .031, which results in standard error of .176. This value lies between the other two error estimates for background effects of .20 and .14. Based on this analysis, a linear trend having a range of 0.5 scale points was generally significant at or beyond the 1 percent level.

GENERAL ERROR TERMS

There are two kinds of differences in food preferences to be assessed for significance--differences among foods and differences among the categories of a background factor. It would therefore be useful to have general estimators to evaluate these differences. The standard error of 0.20, as developed above to include between-survey error, is the best value to test differences among foods. If one is testing at the one-percent level of significance for two foods drawn at random, the difference between means would have to be t multiplied by $\sqrt{2}$ SE. In this case, $t_{.01} = 2.57$ and SE = .20. Hence the difference between means would have to be 0.73.

However, if one food is tested against more than one other food, the problem of multiple comparisons arises and one would not be truly working at the one-percent level. By the conventions of statistical inference the one-percent significance level, as computed above, is correct only when the two food means to be compared have been drawn at random from the set of 438 means. In actual use of the data this is seldom the case. Since a person who uses the data generally focuses attention only on large differences, in effect he has considered and passed over as insignificant an unknown but perhaps large number of differences before finding the one which reaches the "one-percent level of significance." This, of course, does not change the magnitude of the difference, but it does alter the status of the inference one can make about it. For example, with 438 foods there are 191,406 possible pairs of means. By chance alone, 1914 of the possible comparisons should reach the one-percent level as computed for a randomly selected pair of means. Since all of the different approaches that might be used in interpreting the results could not be anticipated, no attempt was made to correct for this factor. Therefore, differences between mean ratings cannot be called significant in the usual statistical sense. Instead, one should look upon a difference between food means of .73 scale points or larger as "very probably reproducible and important." Comparisons among foods must be made with caution even when the difference between means is 0.80 or better; or else a multiple range test, such as Tukey's or Duncan's, should be used.

Later on, comparisons will be made not only among single foods, but also between groups of foods as combined into classes and subclasses (see Chapter 10). It is obvious that the means of such groups will be more reliable than the means of single items. The increased reliability, of course, depends upon how many foods are combined, being inversely proportional to the square root of the number of foods; however, making precise adjustments according to the number of foods involved was considered unwarranted. One reason is that it is probably meaningless to attribute any importance to a very small difference in preference ratings no matter how reliable it is, since the difference is unlikely to be reflected in behavior. Therefore, while the increase in reliability is recognized in the discussion wherever appropriate, no definite criteria for the amount of the increase have been established.

Multiple comparisons do not enter the picture for tests among the categories of a background factor for a given food. For those factors lying on a continuum, it was found that if the means are fairly evenly distributed, a range of 0.50 scale points was ordinarily significant at the one-percent level. Since **area** cannot be placed on a continuum, it was estimated that the range of means should be at least 0.80 scale points for the differences among areas of the country to be considered important. When background factors other than **area** did not show a trend but had a total range of 0.80 scale points, they were also considered important and as such were entered in the tables of background effects.

In subsequent discussions of the data, then, the following criteria were used to estimate the importance and reproducibility of differences. For differences, both between foods and among background categories, where no trend was evident, the means had to be at least 0.80 scale points apart. For differences among background categories showing a more or less linear trend, the total range had to be at least 0.50 scale points.

Chapter 6

VALIDATION OF PREFERENCE AS A PREDICTOR OF CONSUMPTION

The reproducibility of mean preference ratings and the stability of the ratings over time and over groups of people have been demonstrated. However, another very important question is: What does a preference rating mean? Is it related to some overt behavior other than the expression of the attitude itself? Investigators of the various aspects of food acceptance have usually assumed that people eat what they like. Even if this is generally true, there are likely to be many reasons why a person does or does not eat a food. Evidence is given here to show the degree to which preference predicts acceptance under various conditions.

Several considerations should be noted at the outset. First, the purpose of the hedonic scale for assessing food preference, whether utilized in laboratory tests or in field surveys, is not unitary. Rather, a variety of uses is intended, only one of which is to infer acceptance, defined as the nonverbal behavior toward foods themselves. Second, acceptance itself is not unitary. Among the behaviors toward food that can be observed and measured are categorical acceptance or rejection of a food, proportion of a normal portion taken, or the proportion of a normal portion consumed. The correlations among these measures are likely to be far from perfect and thus may be expected to bear different relationships to preference ratings. Third, it is plausible that the degree of relationship between preference and acceptance is dependent upon the type of food or menu component (e.g., meats, vegetables, etc.), or the environmental conditions, including whether consumption is *ad libitum* or restricted.

FIELD STUDIES OF ACCEPTANCE

Over the years, several investigations have provided data on various aspects of food behavior, even though some of them were conducted to obtain other information, such as nutritional status. Essential information about each investigation is given below including the general purpose of the study, number of respondents, food preference measures employed, and food acceptance indices obtained. This information is summarized in the first six columns of Table 6.1.

1. **Normal Feeding—A Ration (categorical acceptance).** An investigation was undertaken* in 1950 to obtain data on the consumption of food by personnel subsisting on the A Ration within the continental limits of the United States. Four installations were selected for the survey: Fort Monmouth, New Jersey, Fort Devens, Massachusetts, Fort Sam Houston, Texas, and Fort Bliss, Texas. Fort Devens and Fort Bliss were selected because they were training centers and their personnel were considered "active." The other two stations were headquarters installations, and the men were considered to have primarily "sedentary" assignments. At each of the four stations, four unit messes were chosen randomly from those units operating cafeteria-type mess halls. The same mess halls were studied throughout a nine-month period

*By the Quartermaster Board, now known as the Quartermaster Research and Engineering Field Evaluation Agency.

Table 6.1

Nature of studies relating preference to acceptance and summary of correlations between these indices

STUDY	PURPOSE OF STUDY	LOCATION AND DATE	DIETARY AND ACTIVITY	DURATION OF STUDY	NUMBER OF SUBJECTS	PREFERENCE MEASURE	ACCEPTANCE MEASURE	NUMBER OF FOODS	r[a]	STANDARD ERROR OF ESTIMATE[b]
1. Normal feeding --A Ration (categorical [illegible])	Measure consumption of A Ration	Pts. Bliss, Monmouth, Houston, Devens, 1950	A Ration; normal activity	9 months	4 mess halls	National survey ratings	Per cent of men accepting each item	46	.59	15.5
2. Normal feeding -- A Ration (preparation and [illegible])	Study of subsistence in Army	Pts. Sill, Monmouth, Belvoir, Benning, 1951	A Ration; normal activity	9 days	50 mess halls	National survey ratings	Per cent of each food consumed	107	.62	9.8
3. Restricted menus -- [illegible] Rations	Effect of vitamin supplementation on performance	Pole Mountain, Wyoming, 1953	Restricted B and C Ration; cold, high activity	1 month	86 men	Survey type ratings by subjects	Per cent of each food consumed	37	.69	6.8
4. *Ad libitum* -- modified A Ration	Effect of *ad lib.* food intake on various physiological indices	Fort Carson, Colorado, 1955	*Ad lib.* A Ration; normal activity	1 month	100 men	Survey type ratings by subjects	Per cent of men accepting each item	38	.77	15.6
							Proportion of normal serving eaten	38	.74	23.5

[a] A positive correlation signifies that as preference increases acceptance increases. All r's are significantly ($P < .01$) different from zero.

[b] Error, in per cent, in predicting acceptance from preference ratings.

with the exception of one unit which was called for duty in the Far East, so an additional mess was drawn as a replacement. Food preference data were not obtained from these groups of soldiers. The acceptance measure was the proportion of men accepting an item at the serving line. Data were obtained on 60 foods, each of which was served from one to 30 times.

2. **Normal Feeding — A Ration (preparation and waste).** In late summer of 1951, a study of men subsisting on the A Ration was conducted under contract with the Quartermaster Corps. One of the purposes was to measure quantities of foods provided, prepared, consumed, and wasted in order to determine the nutritional adequacy of the foods eaten, the acceptability of the foods provided, and the extent of wastage in the mess halls. Ten units in each of the following five major Army posts were sampled: Fort Monmouth, New Jersey, Fort Belvoir, Virginia, Fort Knox, Kentucky, Fort Benning, Georgia, and Fort Sill, Oklahoma. Of the 50 units, the men in five units were considered to have primarily sedentary assignments, very active duties in 15, and moderate degrees of activity in the remaining units. Physical weight measurements were made of every food as delivered to the mess, before and after preparation, and of the leftovers and discarded food. In this phase, the wastage data for more than 288,000 man-meals were recorded, although no breakdown was made according to the activity requirements of the personnel. Percentages of total waste, including waste from overpreparation and plate waste, were calculated for 212 foods. The survey teams reported they had reason to believe that the foods served during the study were of better than normal quality and that direct or indirect orders were issued to the soldiers to minimize waste. If this were true, then we should expect the preference-acceptance correlations to be underestimates of the true relationship, since under these conditions the acceptance of less preferred items would tend to rise while acceptance of the better liked items would not be affected.

3. **Restricted Menus — Operational Rations.** In 1953, the Medical Nutrition Laboratory[11] conducted a field test to ascertain the effects of vitamin supplementation on performance in a cold environment. This test provided an opportunity to determine the effect of repetitive eating of a limited number of food items on preference ratings and consumption. Eighty-six volunteers subsisted on a fixed, known diet of four daily menus consisting of 41 foods. In those stages of the test from which the data in this report were obtained, all meat, vegetable, and fruit items were canned; and all items other than milk, bread, butter, and dry cereals were components of operational rations. Controls were instituted in order to insure that during the entire test the subjects had no access to additional foods. The food preference questionnaire, administered once in the second week and again in the last week, contained the names of all items served. The percent of each food eaten represented the acceptance index.

4. **Ad libitum — Modified A Ration.** The fourth study was conducted at Fort Carson, Colorado, in January and February 1955, again under the auspices of Medical Nutrition Laboratory, Office of The Surgeon General, to determine the relationships among *ad libitum* food intake, various body measurements, and biochemical indices. The subjects were 100 enlisted volunteers who subsisted on a modified A Ration.

These modifications consisted of serving milk, fresh fruit, and the better cuts of meat at more meals than usual. Certain types of items were eliminated from the menu in order to facilitate analysis of plate scrapings. Generally, these items were nonhomogeneous mixtures such as beef stew, chicken a la king, or auxiliary foods such as gravies and salad dressings. The men were allowed to take as much of, or reject completely, any item on the menu at any meal. There were approximately 150 different foods served during the four weeks of the test. The food preference questionnaires, administered during the second and fourth weeks of the test, were the same in design as those used in the national surveys and contained the names of 54 of the foods scheduled to be served during the test.

PREFERENCE MEASURES

In the first two studies, preference ratings for the foods were not available from the subjects who participated in the acceptance phase. The best available estimates of preference were the ratings obtained in the surveys reported here. Some foods served during these studies were not included in the preference surveys and hence are not considered in the subsequent analyses. In other cases, preference ratings were available for items only similar, but not identical, to the foods actually served. The differences between the foods actually served and those for which preference ratings were available were of two types: first, the method of preparation may have been different (e.g., **fried liver and bacon** instead of **grilled liver and bacon,** or **french onion soup** instead of **onion soup**); second, the difference may have been in some ingredient or accompanying item (e.g., **asparagus salad** instead of **asparagus salad with french dressing,** or **baked macaroni** instead of **macaroni with cheese**). When two or more survey food names might have applied to the food actually served, the mean of their ratings was taken as the measure of preference.

In the third study (restricted menus) and fourth study (*ad libitum* -- A Ration), both preference and acceptance data were obtained from the same subjects. Preference questionnaires were administered twice, which provided further evidence of the reliability of the preference data. For the third test, the correlation between average rating for the 41 items on the first and second administration of the questionnaire was .89; for the fourth study, the correlation was .98. The lower value of the first correlation was probably due to the fact that some foods, but not all foods, suffered from monotony effects because repetition of menus was an experimental condition.

In the third study, preference data from the first administration were used in subsequent correlations since the ratings obtained in the second administration could have been affected by the repetitive feeding. For the fourth study, however, the ratings from the second administration were used because the subjects during the course of the test became familiar with more items listed in the preference questionnaire. Presumably, therefore, these ratings were more meaningful. Also, the ratings on the first administration may have been influenced by the unusual *ad lib* eating situation. Repetition of items in this case was not frequent, so that monotony effects were not important.

ACCEPTANCE MEASURES

In the first study, the index of food behavior that was correlated with mean preferences was the percent of men who accepted an item. In the second investigation, **percent of food** that was wasted, comprising both plate waste and preparation waste, was used to calculate percent consumption, the acceptance index. A more refined measure was not used because adequate information was not available to determine the relative extent to which overpreparation waste was due to failure of the men to eat normal servings or to faulty estimates on the part of mess personnel of anticipated consumption. The plate waste was used for the third study since the ration issue was fixed.

Two acceptance measures were employed for the analyses of the last study. The first was the **percent of men** accepting an item, and the second was the **proportion of normal serving** consumed. It appeared advisable not to use the net amount of each item consumed, because this measure would not take into account the fact that the amount of any item eaten, or taken, is dependent upon the function of that item within the meal. For example, it would be inappropriate to compare the identical ratings for roast veal and apple jelly with their respective consumption (approximately 90 grams and 10 grams) and conclude that the ratings are not related to consumption. To resolve this problem, the proportion of a normal serving was chosen as the most meaningful measure. The following sources were consulted to estimate the weight of a normal serving of each food: The **Master Menu** for the period of the test; **Army Technical Manual TM 10-412** (cook book); **Navy Cook Book**; and food technologists and home economists. In some cases it was necessary to use the average serving during the actual test; but, where figures for normal servings were available from sources other than the tests, they were used. Whenever sources differed on normal serving amounts, the modal estimate of the amount was used.

The fourth study provides the only indication of how close the relationship is between two basic measures of acceptance: percent of subjects who categorically accept rather than reject an item, and an index based on the amount of food consumed. The correlation between the two was .73, indicating that although both to a considerable extent measure the same underlying phenomenon, about 47 percent of the variation in either index is still unaccounted for. This fact tends to substantiate the previously cited assertion that acceptance is not unitary.

RELATIONSHIP BETWEEN PREFERENCE AND ACCEPTANCE

Preference ratings were not available for all foods served during the first two studies. The number of foods for which both preference and acceptance data were available were 46 and 107, respectively. Not all foods scheduled for serving at the third and fourth studies were actually served during the interval in which acceptance data were collected. Thus the numbers of items for which both preference and acceptance data were available were reduced to 37 and 38, respectively.

The last three columns of Table 6.1 summarize the relationships between preference and acceptance. The correlations vary from .59 to .77. No two correlations are significantly different from each other; never-

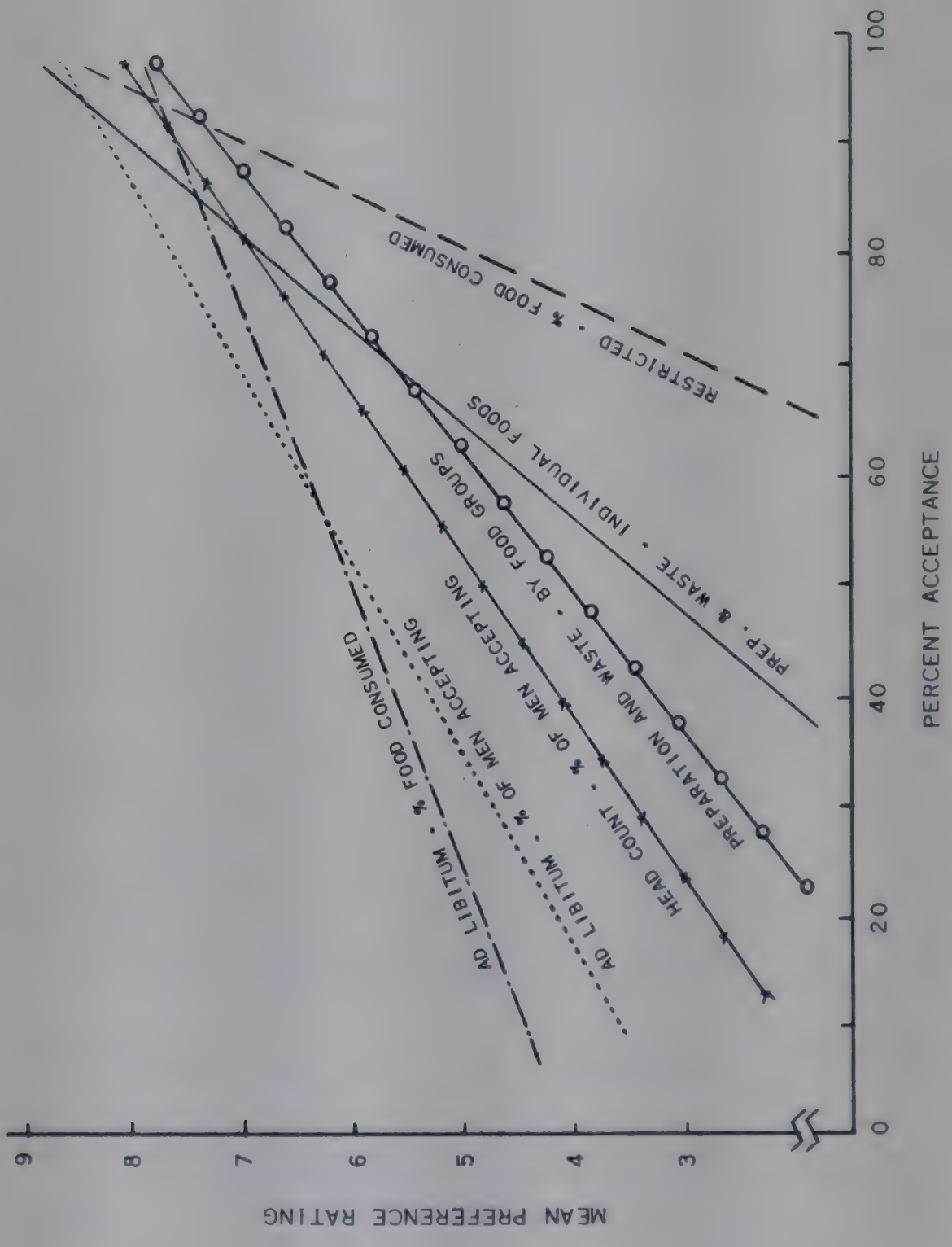

FIGURE 6.1

Six relationships of preference to acceptance from four studies.

theless, it will be noted that the highest correlations were obtained in the two cases where the preference and acceptance measures were obtained on the same subjects. This result might also be attributable to the fact that familiarity with the actual foods may have made the questionnaire items less ambiguous.

Figure 6.1 shows the regression lines for each study. Besides highlighting the significant relationships between preference and acceptance, the differences in slope allow additional inferences to be made. The regression line for the restricted condition is steep, with an accompaning small standard deviation of the acceptance index, whereas for the *ad libitum* condition it is gentle with a large standard deviation of the acceptance indices. In the former case, even low rating foods were not highly rejected, probably because alternative items were not available. In the latter case, where rejections of one food could be compensated by increased consumption of others, foods with even moderately high ratings were still rejected; the soldiers could afford to be "choosey," and an item had to be very well liked before rejection became minimal. The other investigations were conducted under conditions which better approximate the normal eating situations; the regression lines for these two studies have slopes that lie between the two extremes.

It is clear that the prediction of consumption from mean ratings is dependent upon the conditions of eating; and, insofar as the first two investigations best approximate the normal messing situation, the regression lines derived from these studies would probably be the best indicators of the typical relationship. The slopes from the other two tests would likely depict the effects of either liberalizing the menus, in which case the standard deviation of acceptance would rise, or restricting the menus, which would probably result in decreasing the spread of percent acceptance.

Figure 6.1 shows two regression lines for the *ad libitum* study, each based on a different acceptance index. The similarity in slope of these two lines indicates that the preceding conclusions are probably somewhat independent of the acceptance index employed.

Two regression lines are also available for the preparation and waste study. One is based, as are those for the other studies, on preference-acceptance plots for individual foods. The other plot represents the preference-acceptance relationship for foods grouped by type (e.g., meats, vegetables); that is, each point used in fitting the regression line is based upon the average ratings and the average waste of all foods within a group. The two slopes are similar.

The correlations discussed up to now represent the preference-acceptance relationships for foods regardless of type; what are the correlations when we consider only meats, or only desserts, or only vegetables?

The second study (A Ration -- preparation and waste) is the only source which included a sufficient number of foods to answer these questions. Ninety-nine foods were assigned to eight food types: desserts and fruits; meats, fish, and eggs; all vegetables including potatoes; vegetables excluding potatoes; potatoes; beverages; cereals and breads; and miscellaneous, largely condiments and sauces. Eight items

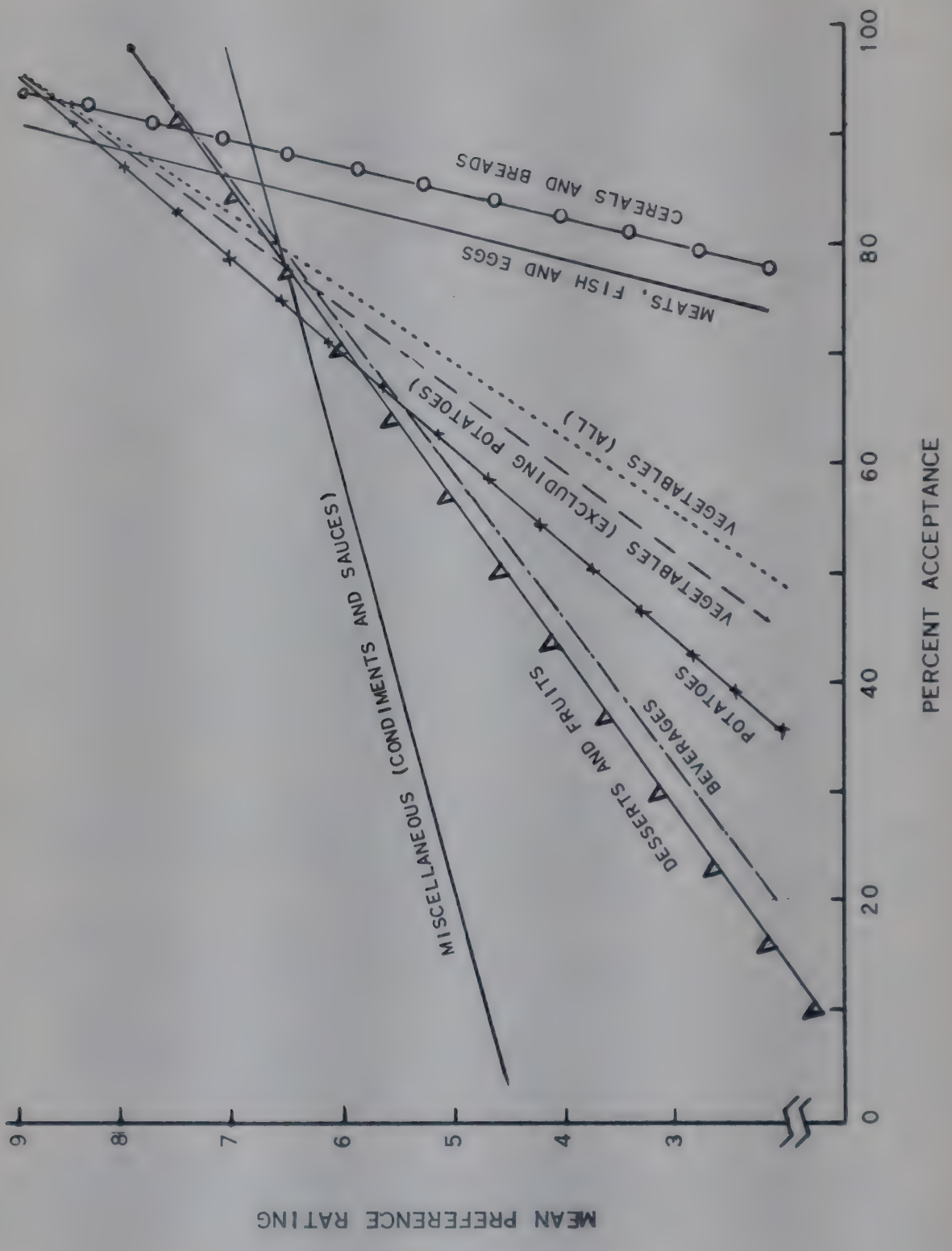

FIGURE 6.2

Relationship of preference to acceptance as a function of food type.

Table 6.2

Correlations between mean ratings and percent consumption for different food types

Food type	N	Average percent consumption	r	Standard error of estimate [a]
Desserts, fruits	21	86.3	.87	4.77
Meats, fish, eggs	28	83.6	.30	6.33
Vegetables (all)	24	73.5	.57	10.59
Vegetables (excluding potatoes)	16	71.0	.50	12.82
Potatoes	8	78.3	.72	5.11
Beverages	12	88.8	.69	10.34
Cereals and breads	6	88.4	.41	4.64
Miscellaneous (e.g., condiments and sauces)	8	75.4	.45	16.30

[a] Error, in percent, in predicting consumption from preference

were not assigned since the additional food types (e.g., salads) would have had only one or two items.

The number of items within each food type, the average percent consumed, the correlation between consumption and preference, and the standard error of estimating consumption from preference are given in Table 6.2. Most striking is the fact that the higher correlations are for those food types that are more "dispensable" in a meal, that is, those types which, if omitted, would not markedly affect the adequacy of the meal; contrariwise, the lowest correlations are for those food types, such as meats, fish, and eggs, which are more necessary to, or form the major component of, the meal.

Table 6.2 and Figure 6.2 further illustrate this conclusion. The ratings of different main dishes cover a range of several scale points; but most people will eat the main dish regardless of preference. Thus, the difference between the percentage taking a high preference item and the percentage taking a low preference item is small, although the difference in satisfaction from the meal may be great. The same considerations apply, to a lesser degree, to cereals and breads.

For potatoes, the slope of the regression line is slight. This means that a small increase in preference rating is accompanied by a relatively large increase in consumption. A plausible reason for this fact may be that in the Army mess halls where potatoes are served as often as three times a day, a man can afford to pass up even a moderately pre-

ferred recipe knowing that he will probably be offered a better liked recipe within a short time. Similarly, desserts can be rejected and the consumer may still feel that he has had a meal, or else that he can make up any deficit with more preferable snacks at the Post Exchange. As with potatoes, a relatively small difference in preference between desserts leads to a relatively marked difference in the percentage who accept them.

The general conclusion is that when an item is not important to a meal, preference will determine whether it will be accepted or rejected; but, when its importance is high, preference is not as effective in determining its acceptance or rejection.

PREDICTION OF CIVILIAN CONSUMPTION

We have shown that preference ratings can predict acceptance by soldiers; but, is civilian consumption similarly correlated with soldier preferences? We might except the relationship for civilians to be poorer because respondents in the surveys might not be representative of the general population. However, if the conclusion offered above is true -- that the greater the number of items available to a consumer, the stronger the relationship of preference to acceptance -- since civilians have more opportunity than soldiers to select their foods, the correlation between the two variables might be expected to rise, except as restricted by cost.

A special problem arises because good estimates of civilian consumption are not generally available. Meats are a good example. A variety of dishes may be prepared from a single cut for each of which preference could be established; however, it is impossible to estimate the proportion of that cut used in each dish, and it would not be valid to use an average preference rating.

For vegetables there are available adequate data on consumption that can be related to ratings of more specific food names. Statistics are available on consumption, in terms of pounds per week per household and on cost[13]. A disadvantage of these statistics is that they were based on data collected in the spring when availability of many items was low. These consumption data were correlated with the preference ratings reported here. Some vegetables were not represented in this correlation; potatoes, for example, because they generally play a different role in a meal, and onions and canned tomatoes because they are so often used as part of a dish rather than by themselves. In all, consumption figures for 15 vegetables were obtained. Some of the corresponding mean preference ratings represented averages of several preparations, or choice of one from among several on the basis of guesses as to the primary uses of the food.

The correlation between civilian consumption of vegetables and preference of soldiers was .58, compared to the value of .50 for consumption by soldiers shown in Table 6.2. When cost per pound was used as another dependent variable in a multiple regression equation, the correlation increased to .67. Even this larger value does not take into account the relative availability of these vegetables, a factor that should further increase the multiple correlation. Information on the total consumption of various foods in the United States has been provided by the U. S. Department of Agriculture[14]. In this case consumption is in terms of pounds per year per capita. For 20 vegetables, the

correlation with preference was .68, taking into account neither cost nor relative availability. The total consumption figures were estimated on a farm-weight basis and in the process some "best guesses" about consumption had to be made; even so, such matters as losses due to spoilage were not estimated.

Despite all the sources of error and the fact that some important variables were not considered, these latter correlations give an indication of the more general validity of the survey means for predicting acceptance. From all of the correlational analyses on the relation between food preference ratings and measures of food behavior, it can be concluded that about 50 percent of the variability of food behavior can be accounted for by preference.

The apparent validity of preference ratings as predictors is dependent not only upon their reliability but also upon the reliability of the acceptance indices. Because the reliability of mean preferences is already more than .90, efforts to increase it further would be unlikely to improve the predictions. Rather, what appears to be a more fruitful approach is to obtain more reliable acceptance indices. Although no estimate of this reliability is available, it is likely to be below that for preference, and increases should lead to more accurate predictions of consumption. Maximizing predictions of acceptance from preference would then indicate how much of acceptance cannot be explained by preference.

Chapter 7

CHARACTERISTICS OF THE RESPONDENTS

The population to be sampled was defined as Army enlisted men stationed within the continental limits of the United States. They were thus a selected subpopulation of the U. S. population. They were all male; none were under the age of 17, and few were over 40; and they were, in general, healthy. Aside from these characteristics, they undoubtedly varied in about as many ways as the population in general. As was pointed out previously, six characteristics were selected for study. Four of these characteristics could be applied to any part of the population; two -- **length of service** and **length of overseas service** -- apply to military personnel only.

Not only did the respondents differ on each of the background factors, but the distribution of men over each factor varied with time. Tables 7.1 - 7.6 show the percentage distribution of respondents over each of the six background factors for Surveys 1-5. The total number of respondents on which the percentages are based is shown in each instance. For Surveys 3 and 4, where two questionnaire forms were used, data are presented for one form only. For Survey 5, the data from the two forms were combined.

AGE OF RESPONDENT

Some definite changes in the distribution of respondents by age group took place between Surveys 2 and 3, which evidently reflected changes in the make-up of the Army due to the beginning of the Korean action. The age distributions were broader in the earlier surveys, with about one-third of the men in the **under 20** category, one-third in the **20-24 years** group, and one-third distributed over the older groups. After Survey 2, the **20-24** group was about twice as large as previously, and all other categories were reduced, with the **under 20** group showing the greatest drop. However, the great majority of the respondents in all of the surveys were young. More than 80 percent in Surveys 1 and 2, and more than 90 percent in Surveys 3, 4, and 5 were under 30 years of age. More than two-thirds were under 25 years, with the exception of Survey 1 where the percentage was 63.8 percent.

Table 7.1

Percentage distribution of respondents by age for five surveys

Survey		1	2	3	4	5
	N	5893	4683	3610	3093	5253
Under 20 years	%	31	32	13	14	12
20 - 24 years	%	33	36	68	68	75
25 - 29 years	%	17	15	10	10	8
30 - 34 years	%	11	10	6	4	3
35 - 39 years	%	5	4	2	2	1
40 years and over	%	3	3	1	2	1

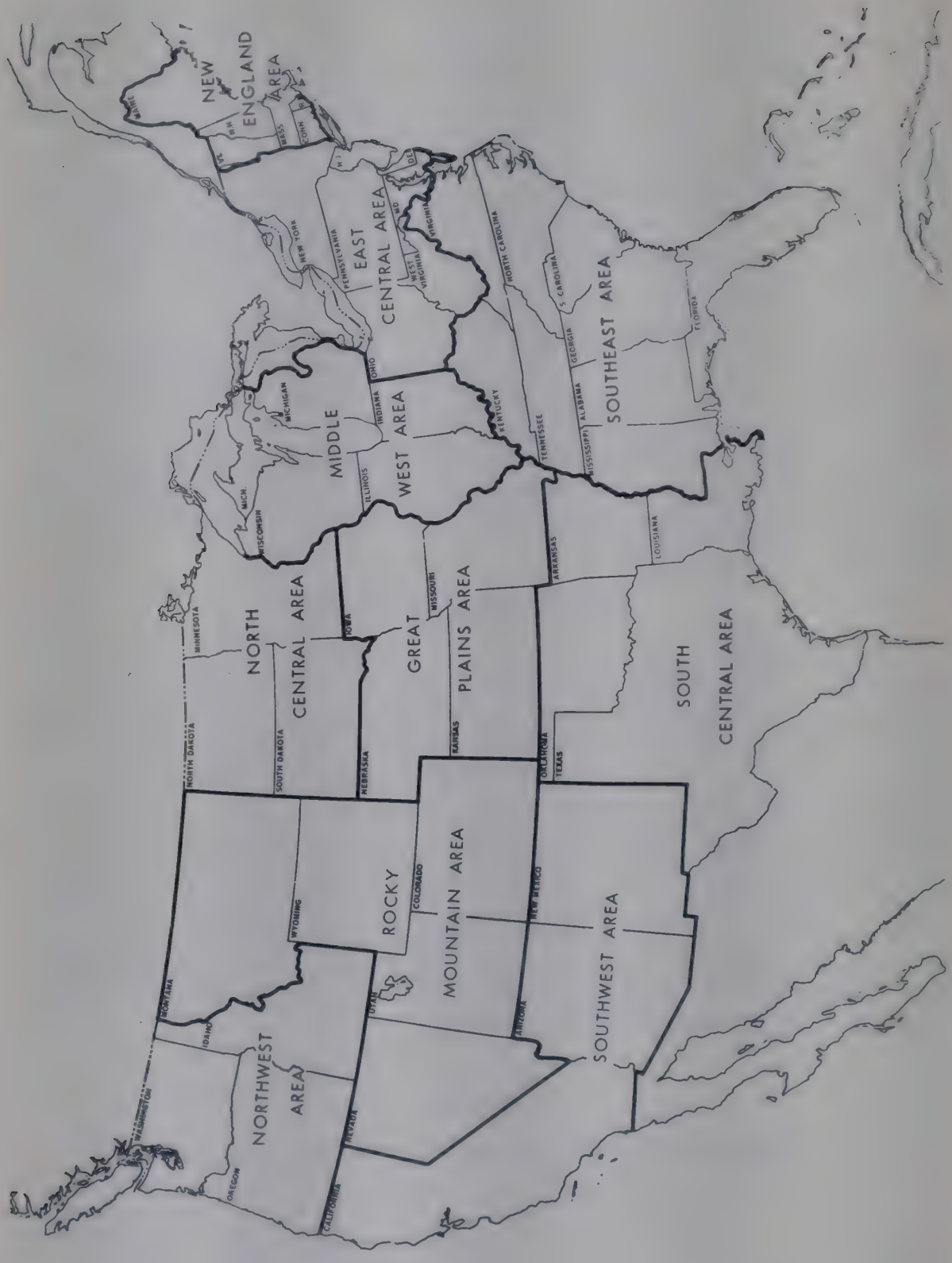

FIGURE 7.1

Geographic areas represented by region of origin categories.

AREA OF ORIGIN

The various areas did not contribute equally to the total number of respondents. This was to be expected since areas were set up on the basis of approximate geographic similarity (Figure 7.1) with no consideration being given to the factor of population. The **East Central** area contributed from 25 percent to 31 percent of the total in every survey, and the **Southeast** contributed about 20 percent. Next in importance were the **South Central** and **Middle West,** each with a minimum of 19 percent in each survey. The proportions from some of the areas were too small to be of any real value. The proportions changed but little over the course of the surveys. The largest change was 8 percent, which occurred between Surveys 3 and 4 for the **Southeast** area.

Table 7.2

Percentage distribution of respondents by area of origin for five surveys

Survey		1	2	3	4	5
	N	5862	4643	3596	3081	5232
Northwest	%	2	2	2	2	2
Rocky Mountains	%	1	2	2	2	2
Southwest	%	4	4	8	7	5
South Central	%	13	12	9	10	9
Great Plains	%	6	6	7	5	4
North Central	%	3	2	2	2	2
Middle West	%	13	12	17	11	13
Southeast	%	20	21	17	25	22
East Central	%	25	29	28	27	31
New England	%	6	7	7	7	8
Multiple	%	4	2	-	-	-
Outside U. S.	%	2	2	2	2	2

LENGTH OF SERVICE

There were marked changes over the course of the five surveys in the distribution of respondents with regard to their total length of service. After the second survey there was a definite shift from an experienced to a relatively inexperienced Army population. In Survey 1, 50 percent of the men had at least three years of service, while only 10 percent had less than six months of service. The trend toward less experience started during Survey 2, and by Survey 3 the situation was almost reversed, with 50 percent in the two categories representing less than six months service and only 20 percent in the highest **length of service** category. The marked change at the time of Survey 3 again should be attributed to the increased rate of induction of younger men due to the Korean action. By the time Surveys 4 and 5 were run, the proportion of very new men had dropped and the largest proportion were in the **6-18 months** category.

Table 7.3

Percentage distribution of respondents by length of service for five surveys

Survey		1	2	3	4	5
	N	5903	4669	3592	3091	5238
Under 2 months	%	-	-	18	7	11
Under 6 months	%	10	21	35	33	17
6 - 18 months	%	22	13	16	33	45
18 - 36 months	%	18	22	10	7	8
36 months or more	%	50	44	22	21	19

LENGTH OF OVERSEAS SERVICE

The change in characteristics of the respondents is most marked with respect to overseas service. In the first two surveys, half of the respondents had some overseas service while about one-third had two years or more, but in the later surveys more than 75 percent had not been overseas at all, and only 12 percent had two years of such service. This again reflects the shift to a younger, less experienced Army.

Table 7.4

Percentage distribution of respondents by length of overseas service for five surveys

Survey		1	2	3	4	5
	N	5761	4634	3576	3075	5193
None	%	44	51	76	78	79
Under 6 months	%	2	2	1	2	2
6 - 12 months	%	5	4	2	2	2
12 - 24 months	%	16	15	8	7	6
24 months or more	%	33	28	12	12	12

Table 7.5

Percentage distribution of respondents by size of town for five surveys

Survey		1	2	3	4	5
	N	5879	4672	3579	3092	5227
Farm	%	27	23	24	24	24
Country, nonfarm	%	-	10	8	8	9
Village (less than 2500)	%	-	9	9	9	8
Small city (2500-25,000)	%	35	20	19	20	18
City (25,000-100,000)	%	28	16	16	16	17
Large city (100,000-1,000,000)	%	11	13	23	22	25
Very large city (more than one million)*	%	-	10	-	-	-

* This category appeared in Survey 2 only.

SIZE OF TOWN

The response categories indicate that this **size of town** factor included more than just the size variable. They are not strictly quantitative and linear. In part of the range, the response categories refer also to the nature of the community, e.g., **country, nonfarm, village, small town.** Responses in these categories may depend upon peoples' verbal habits or ways of thinking as much as upon the actual concentration of population in their home communities. Whatever the real nature of the variable, it appears to be a reliable and useful way of classifying people. The samples of respondents remained quite stable from survey to survey in regard to **size of town.** A constant proportion of about 25 percent of the men came from farms; about the same proportion came from large cities; and the remaining 50 percent was distributed over the other categories in almost exactly the same proportions in each survey. The data from the first two surveys are consistent with this statement in spite of the differences in the response categories. For example, in Survey 1 the proportion indicating **small town** was just about equal to the proportion in this category combined with **country, nonfarm** and **village** in the later surveys. In Survey 2, combination of the two highest categories gives the same proportion for large cities as actually obtained in the later surveys. The definite shift in the proportions from **large city** to **city** may be attributed to the specific definition given in the questionnaire.

EDUCATION

The distribution of respondents according to **education** was fairly constant, though less so than for **region of origin** and **size of town.** Comparison of the third and subsequent surveys with the earlier ones

is complicated by the inclusion of the **business college** category in the later surveys; however, certain effects may be noted in spite of this. The major change was the definite increase after Survey 2 in the proportion of men who had attended college. The highest percentage of men who had not completed the eighth grade was found in Survey 1, but was only 11 percent. The first two surveys showed consistently higher percentages in all of the lower categories representing less than high school graduation.

SUMMARY OF CHANGES AMONG SURVEYS

The major, and apparently the only important changes, in the survey populations took place between the second and third surveys. Both before and after this time the individuals came from the same areas and the same kinds of communities; however, in the third and later surveys the populations differed in other characteristics. They were younger, had more education, and were less experienced in Army life, particularly with regard to overseas experience.

Table 7.6

Percentage distribution of respondents by education for five surveys

Survey		1	2	3	4	5
	N	5850	4681	3599	3088	5233
Less than 8th grade	%	11	9	7	7	7
8th grade	%	15	14	12	12	12
1 year high school	%	13	11	9	8	8
2 years high school	%	15	15	10	10	10
3 years high school	%	11	12	8	8	8
4 years high school	%	27	30	29	31	29
Business college	%	-	-	7	7	6
College	%	8	9	18	17	20

INTERDEPENDENCE OF BACKGROUND FACTORS

One aspect of the distribution of respondents with respect to the background characteristics has been touched on only lightly up to this point, but merits fuller consideration. For the most part the distributions are not independent, and there are many instances of marked interdependence. This raises problems of interpretation that will have to be considered continually in discussing preference as related to the background characteristics. For example, the factors of **length of service,** and **age** were highly correlated, particularly in Surveys 3, 4, and 5. The Korean action brought about a shift toward an Army of new recruits, where the large group of younger men tended to have little total service and almost no overseas service.

These joint distributions were investigated by the method of cross-tabulation. The group of respondents in each category of one background factor was tabulated according to the categories of another factor. Two examples of the resulting distributions are shown in Tables 7.7 and 7.8. No attempt was made to cross-tabulate for all pairs of factors in all surveys because it is of limited value since it could not test for the possibility of interactions among three or more factors. However, sufficient analyses were made to indicate the more important cases of nonindependence. These were **age** by **length of service** (Table 7.7), **length of overseas service** by total **length of service,** and **age** by **length of overseas service. Length of overseas service** was found to be so closely related to **age** and total **length of service** in most instances that separate analysis of its effect on preference would have been pointless; hence it was eliminated.

Other instances of significant interdependence appeared in the joint distributions of respondents by **area of origin** and **size of town.** Table 7.8 gives the distribution for selected areas in three of the surveys. It may be noted that the **South Central** and **Southeast** areas have much higher percentages of respondents from **farms** and much lower percentages from **large cities** than do the **Middle West** and **East Central** areas. Smaller, but perhaps important, differences are evident in certain cases between surveys.

Table 7.7

Percentage distribution of respondents by length of service and age for two surveys

Length of Service			**Age**					
Survey 1			Under 20	20-24	25-29	30-34	35-39	40 and over
	N	5568	1670	1870	945	643	284	156
Under 6 months	%	10	27	3	1	0	0	0
6-17 months	%	21	48	17	4	3	1	0
18-35 months	%	18	23	32	2	1	2	1
36 months or more	%	51	2	48	93	96	97	99
Survey 3A								
	N	3521	449	2398	343	198	81	52
Under 2 months	%	18	17	23	2	0	0	0
2-5 months	%	35	28	44	9	1	1	2
6-17 months	%	15	38	14	12	3	5	0
18-35 months	%	10	14	10	11	3	2	0
36 months or more	%	22	3	9	66	93	92	98

DISTRIBUTION OF BACKGROUND CHARACTERISTICS BY INSTALLATIONS

Although installation, i.e., a respondent's location at the time of the survey, was not a background characteristic in the same sense as the six that were included on the questionnaire, it can be considered in the same way. Again, the problem of the nonindependence of the distributions by installation and various other factors was encountered. For example, in Survey 2 there were only three installations where less than 15 percent were in the **under 20** age group, but in Survey 3 there were 23 such installations. Similar variations were noted with respect to some of the other background factors.

The respondents at any particular installation were not expected to be a random sample of the Army population. Any given installation is likely to have a higher proportion of its men from neighboring regions of the country. Further, men of a certain age range, educational level, or length of service will tend to be concentrated at particular installations according to the types of activity which are most important there; for example, concentration of young recruits at basic training posts.

The fact that there are differences in soldiers' background characteristics from installation to installation has two implications. Both assume that the differences in background characteristics are related to differences in preferences for individual foods. First, sampling only a few installations may produce a biased estimate of the general preference for individual foods; therefore, respondents should be drawn from a larger number of installations. Second, at installations where the soldiers have similar background characteristics and where the Master Menu can be supplemented by local option purchase of foods, the background of the personnel might be considered in order to select foods most liked by men with these characteristics.

OTHER POSSIBLE FACTORS

These factors were the only ones that were measured directly. No information was obtained on two very significant factors which may exert an influence on the development of food preferences. The first of these is the national origin of the parents. Eppright[3] has shown that some portion of variability in food preferences is attributable to this factor. National origin undoubtedly entered into three elements that were measured in the surveys; **education, region of origin,** and **size of town** differences. The second factor that was not measured directly is the socio-economic status of the families from which the respondents came. To some extent, this factor enters into the determination of educational differences.

Aside from these more or less objective methods of classifying individuals with respect to their background, there are undoubtedly individual factors affecting the respondent's attitude toward food in general and towards specific foods. We may assume that the individual's food preferences will be related to many different aspects of his entire personality. Food is the only one of the three necessities -- food, clothing, and shelter -- that is absolutely necessary to the continuation of life.

Table 7.8

Percentage distribution of respondents from selected areas distributed by size of town category for three surveys

Size of town		Area											
		South Central			Middle West			Southeast			East Central		
Survey Number		2	3A	5	2	3A	5	2	3A	5	2	3A	5
	N	537	302	470	533	614	674	946	573	1106	1287	983	417
Farm	%	34	31	37	21	21	22	34	38	38	13	14	10
Country (nonfarm)	%	11	10	10	8	6	4	11	9	11	10	9	7
Village	%	8	10	7	10	10	10	8	7	6	9	10	9
Small town	%	23	22	15	21	15	16	20	20	17	17	18	17
City	%	14	15	15	14	18	16	15	17	18	16	16	16
Large city	%	10	13	17	27	31	32	12	9	9	35	34	41

Food has been shown to be closely related to the psychological needs of the individual -- his frustrations, his complexes, and his desires. Since each individual has been subjected to an entirely different set of circumstances, including social and physical environment, it must be expected that some of the variability in food preferences could not be explained on the basis of any factors that have been suggested here.

Chapter 8

CLASSIFICATION OF THE FOODS

In establishing the primary food classes, an attempt was made to use a functional concept of classification and to place together in "competitive classes" those foods which we may assume will often, or usually, be competing for the same spot in the normal menu pattern. This classification has a definite logic, but it also poses difficulties, mainly in the placement of many of the foods. While this could not be done with complete consistency, the foods in the main classes, such as soups, salads, vegetables and main dishes will be readily accepted by most meal planners, and consumers as well, as belonging together.

COMPETITIVE STATUS OF FOODS

The foods within a class compete in the sense that in the usual menu the inclusion of one item of a class means the exclusion of all others. Vegetables are one exception, since two of them are often included in the same meal, and certain combinations, such as pie a la mode, are another. It is reasonable to assume that the consumer's behavior, expectation, and preferences are oriented in a manner generally consistent with such a classification. However, the questionnaires did not call the respondents' attention to the idea of competitive foods. Rather, each of the questionnaires included items from most of the classes, and the serial order of items in each questionnaire was randomized. It is not likely that very many consciously rated the items in terms of their membership in competitive classes, rating one item "as a salad," another "as an entree," etc., even though the customary function, or position of the item in the meal, may have affected their responses.

One cannot pursue the concept of classification based on competitiveness too far, because there is frequently competition among the various classes for inclusion and acceptance in the meal. For example, soups may compete with salads, or one of the starch dishes may compete with the foods classified as **Main Dishes.** There may also be complex interactions among the items finally included in a given menu, which would be particularly evident if more food is offered the consumer than is desired. In such a case, the consumer might reject a low-preference entree and accept only vegetables, potatoes, salad, bread, and dessert. Or he may pass up low-preference side dishes, such as a salad or vegetable, if he can have all he wants of the entree, potatoes, or dessert. A considerable degree of substitutability among items, together with great flexibility in the patterning of types of items in a meal, is possible. Eleven competitive classes were established: **Accessory Foods, Beverages, Breads, Desserts, Cereals, Fruits, Main Dishes, Potatoes and other Starches, Salads, Soups,** and **Vegetables.** Most of the classes are divided into sub-classes, and these are further divided in the case of **Desserts** and **Main Dishes.** It will be noted that the sub-classes are based for the most part on similarity of food type, e.g., **Pies** or **Cakes** under **Desserts,** and **Beef, Pork,** or **Lamb** under **Main Dishes.**

In most classificatory schemes there is a tendency to add categories that might include only a few items or to allow a "miscellaneous" class

to expand unduly. This difficulty was solved by introducing a class called **Accessory Foods.** These items are functionally related only in the sense that they are primarily designed to accompany other foods and constitute only a minor part of the nutritional value of a meal. Arbitrary placement of an item in one food class or another was frequently required, especially for **Salads vs. Accessory Foods,** and **Salads vs. Vegetables.**

Some items properly belong in more than one class as judged by their competitive status; however, for economy of presentation, each food has been included only once. This, of course, does not prevent cross comparisons between foods in different classes or sub-classes. The general discussion of background effects has been organized around this classification. The ratings for individual foods were summarized by sub-classes and by classes for background characteristics to determine whether general effects emerge. Thus, the groupings may be considered, in effect, as a series of hypotheses; namely, that the foods of a particular class or sub-class, because of similarity of type or function, should tend to vary together. Once a particular grouping had been set up, all of the foods included therein were thereby eliminated from all other possible classifications.

Preference and background data are presented in tables for each food in order that their competitive status may be evaluated. The discussion of food sub-classes and classes develops a frame of reference for the items. Individual items are compared: (1) with others of the same sub-class, either foods that are different or those that are similar except for manner of preparation; (2) with different sub-classes but the same class; and (3) with different classes.

ORGANIZATION OF THE TABLES

Each of the tables 8.1 to 8.11 is devoted to one of the food classes. All the foods from eight surveys appear once in the tables, only one listing being made in those cases where items of identical description were included in two or more surveys. The food names are spelled and punctuated exactly as they were in the questionnaire. When two preference ratings were available for one item, the rating selected for the table was that from the most recent survey for which background information was also available. In the event no background information for either was available (background was not analyzed for Surveys 6 to 8), the rating from the most recent survey was selected for the table. The most recent rating was used because it best represents the preference of the present Army population. Following the food name (Column 1) are ten columns of preference and background information.

Column 2 presents the **mean preference rating** for each item, sub-class or class. Preference ratings for the sub-classes and classes are unweighted averages of all the items comprising the sub-class or class. The over-all mean rating of 6.52 is assumed to be a reasonable indication of preference for foods in general inasmuch as any weight given the average by repetition of well-liked items -- for example, many cakes with varied frostings -- is balanced by repetition of disliked items (different preparations of asparagus and broccoli, for example).

Column 3 labeled **difference from class mean** presents the differences between the mean preference rating of the food class, which is the figure appearing in each table at the head of column 2 and, (1) the rating appearing for each sub-class of that class, or (2) the rating of each food in the class. A positive value indicates that preference for the sub-class or item is higher than that for the class; and a negative value indicates a higher preference for the food class in general. These differences constitute an index of the preference, or competitive status, of food items and sub-classes relative to the class in which they are located.

Column 4 gives the **centile rank** of each individual food among all of the 438 foods. This measure is, in effect, a rank ordering of all of the dishes surveyed on the basis of their mean ratings. It permits the reader to determine by quick inspection just how a particular food stands in relation to all other foods, whereas the previous column shows the standing only in relation to the class mean. These centile ranks were derived by plotting mean ratings, ranked according to magnitude, against the cumulative percentage of foods rating at or below that point. A best-fitting smooth ogive was drawn and the boundaries of the centiles, in terms of the mean rating, were read from the curve. This smoothing method had two effects. First, the centiles are much narrower near the middle of the distribution than toward the extremes, e.g., the 55th centile has a range of only .02 scale points while the 99th centile has a range of .20 scale points. Second, each centile does not necessarily contain the same number of foods.

Column 5, labeled **percent not tried,** provides an index of degree of familiarity with the food. It gives a combined percentage. Most of the cases contributing to this percentage were those respondents who checked the **not tried** category that appeared alongside the preference scale. There were, in addition, some cases of complete non-response which were included with the **not tried** responses for purposes of this tabulation. The contribution of such non-responses to the index was low relative to the **not tried's.** Most respondents completed their questionnaires fully; also, any questionnaire where 20 percent or more of the items was omitted was eliminated from the analyses. It may be noted that for most of the very common foods this index is low—of the order of one percent or less which probably represents the frequency of oversight.

Column 6 gives the **standard deviation** of the mean preference rating for the individual foods. Although little use has been made of this parameter either in the analysis or in the report for reasons discussed in Chapter 5, certain of its features should be pointed out. Inspection of the table shows that it ranges from a low of .85 for **hot rolls** (Table 8.3) to 3.43 for **shredded carrot and lettuce salad** (Table 8.9). The average is about 2.00 scale points. This non-homogeneity is the most notable characteristic of the standard deviation. It has a high inverse correlation with preference (see Chapter 4), which is believed to result, in large part, from the scale itself, which fails to provide enough categories at the high end to permit respondents to express their full range of preferences. Certainly, however, this is not the only reason for differences among the standard deviations. It also reflects, to a considerable but unknown extent, the degree of agreement among respondents in their attitudes toward a food.

The remaining columns of the tables are devoted to exposition of the more important background effects. In these tables effects are shown only for the individual foods; they are not given for the class or sub-class. Effects for the latter are given in Table 10.1. A row of asterisks appearing after a food indicates that background effects were not analyzed for that food. A blank space means that the background data were analyzed for the food, but that the particular effect did not meet the criterion of importance.

Age, education, length of service, and **size of town** each has two parts of the column. One part, labeled **trend,** indicates that nature of the relationship of the particular factor to preference. Entries in these columns are coded as follows: **U** = up, i.e., preference increases with an increase along the continuum of the background factor; **D** = down, i.e., preference decreases with an increase in the factor; and **N** = no trend, i.e., the preference-background relationship is important but shows no identifiable trend. The second part for each factor, labeled **range,** gives the difference between the highest and lowest preference ratings across the categories of the factor.

The last column of the tables, for **region of origin** gives information comparable to the above, but since the geographical areas do not form a continuum, instead of indicating a trend and a range, there are three parts to the column. They show the area or areas of highest preference then the range, and the third shows the area or areas of lowest preference. The codes for the areas are given in a footnote in each table. Whether an effect was important enough to be cited in the tables was determined by the magnitude of the range. For effects which had an identifiable trend the minimum range required for citation was .50 scale points. The minimum range for "no trend" effects, including all **region of origin** effects, was .80 scale points. As computed from the standard error finally adopted for these cases this would represent the one percent level of significance, but attention is again invited to the various assumptions and qualifications involved. The development of the criteria together with the qualifications is discussed in Chapter 5.

DISCUSSION OF THE DATA

The factual data contained in the tables, plus the many interesting relationships and interpretations they suggest, amount to much more than it would be reasonable to try to discuss. There had to be selection, but here the burden of responsibility was less than in selecting the information to go into the tables, because the information is still there for the reader. Thus, it was not necessary to be exhaustive in the discussion. One main objective of the discussion that follows has been to demonstrate various ways of looking at the data and to suggest patterns of interpretation. A certain type of relationship may be pointed out for one group of foods as an example, but not for other groups where it may be equally appropriate. The discussion is designed to give a general overview of the findings. The main concern is with groups of foods with less emphasis on the results for individual items unless they happen to illustrate something of particular interest or general significance.

The main context of the discussion will be as follows: (a) **relative**

preference status of classes and sub-classes, (b) general relationship of preference to respondents' background characteristics, (c) similarities and differences among groups of foods that otherwise might not be noticed because of the way the tables are arranged, e.g., when similar foods appear in different classes, (d) incidental items of especial interest, such as findings which corroborate or contradict common knowledge, and (e) generalizations about the results where this is possible.

The discussion of results is divided into two parts—Chapter 9 on relative preferences among foods and Chapter 10 on preference-background relationships. This split was made in the interests of brevity and clarity, although there were good reasons for presenting and discussing relative preference among foods and background effects together. How preference may vary with the respondents' characteristics is of considerable interest and importance when one considers either individual foods or food groups. Nor can the background effects be considered in the abstract; to be meaningful they must refer to the actual foods. We need to look through the same lattice of information in two directions. Simultaneous presentation is not suitable because the data are too extensive and complex.

The compromise is illustrated in the tables. Those in this chapter are arranged by class and sub-class and contain the only complete listings of individual items. Of necessity, they also had to present the background effects for individual foods. Although the discussion in Chapter 9 is mainly oriented toward the foods themselves and is intended to provide an understanding of their relative status, the background-preference information has not been avoided but has been used wherever it seemed appropriate. However, the primary emphasis on background effects has been reserved for Chapter 10. Table 10.1 summarizes the information for food classes and sub-classes and the discussion concerns generalizations about the relationships of respondent characteristics to food preferences.

TABLE 8.1 Accessory foods - summary of preferences and their relation to respondents' background

FOODS	MEAN PREFERENCE	DIFFERENCE FROM CLASS MEAN	CENTILE RANK	% NOT TRIED	STANDARD DEVIATION	AGE		EDUCATION		LENGTH OF SERVICE		SIZE OF TOWN		REGION OF ORIGIN		
						TREND	RANGE	TREND	RANGE	TREND	RANGE	TREND	RANGE	HIGH	RANGE	LOW
I. ACCESSORY FOODS	6.18															
A. CONDIMENTS AND RELISHES — SWEET	6.45	.27														
FRIED APPLE RING	6.59	.41	50	10	1.83					D	.56					
COCONUT	7.03	.85	67	3	1.71	D	.95									
SWEET PICKLES	6.55	.37	48	1	1.87							D	.64	NE SE	.93	SW
RAISINS	6.17	- .01	34	1	2.02			N	.85	D	.65	D	.77			
SEEDLESS RAISINS	6.27	.09	37	30	1.98	*		*		*		*			*	
PICKLE RELISH	6.08	- .10	31	4	1.94											
B. CONDIMENTS AND RELISHES — OTHER	6.01	-.17														
CARROT STRIPS	5.79	- .39	23	2	2.24	U	1.15							MW	1.74	SE SC
CELERY	6.38	.20	41	3	2.11	*		*		*		*			*	
RAW CELERY	6.47	.29	44	2	2.21	U	2.05	U	1.16					EC SW GP	1.47	SE
STUFFED CELERY	5.90	- .28	26	6	2.27	U	.51	U	.91					SW	1.17	SE
OLIVES	5.64	- .57	19	2	2.68	U	1.39	U	1.16			U	1.06	SW	1.75	SE
BLACK OLIVES	4.69	-1.49	5	10	2.69	*		*		*		*			*	
GREEN OLIVES	5.83	- .35	24	6	2.64	*		*		*		*			*	
FRESH GREEN ONIONS	6.52	.34	46	6	2.55	U	.94							SC	.88	NE
SLICED RAW ONIONS	6.05	- .13	30	1	2.36	U	.86	N	1.05							
DILL PICKLES	6.54	.36	47	2	1.97											
RADISHES	6.36	.18	40	2	2.01											

Codes for Trend: *Background not analyzed

U - Preference increases with increase in factor
D - Preference decreases with increase in factor
N - Variation in preference but no monotonic trend with factor

Code for Region of Origin: NE - New England; SE - Southeast; EC - East Central; SC - South Central; MW - Middle West; SW - Southwest; NC - North Central; GP - Great Plains

Northwest and Rocky Mountain Regions omitted because of small N's.

FOODS	MEAN PREFERENCE	DIFFERENCE FROM CLASS MEAN	CENTILE RANK	% NOT TRIED	STANDARD DEVIATION	AGE TREND	AGE RANGE	EDUCATION TREND	EDUCATION RANGE	LENGTH OF SERVICE TREND	LENGTH OF SERVICE RANGE	SIZE OF TOWN TREND	SIZE OF TOWN RANGE	REGION OF ORIGIN HIGH	REGION OF ORIGIN RANGE	REGION OF ORIGIN LOW
C. HOT CONDIMENTS AND SAUCES	**5.50**	**-.68**														
HORSERADISH	4.81	-1.37	6	11	2.57	N	.96			U	1.23			MW	.98	SW SE
MUSTARD	6.34	.16	39	1	1.82											
BLACK PEPPER	6.47	.29	44	4	1.96	U	.91	D	1.06					SE SC	1.08	NE MW GP
HORSERADISH SAUCE	4.79	-1.39	6	36	2.51	*		*		*		*			*	
MUSTARD SAUCE	5.11	-1.07	9	13	2.09	*		*		*		*			*	
D. SAUCES AND GRAVIES	**6.24**	**.06**														
CATSUP	6.96	.78	64	2	1.61											
HOT BACON DRESSING	6.13	- .05	32	20	1.95			D	1.23			D	.78	SE	1.42	NE
FRENCH DRESSING	6.52	.34	46	4	1.82									NE	.97	SW
BROWN GRAVY	7.39	1.21	81	1	1.61	U	.51									
CREAM GRAVY	6.46	.28	44	4	1.94			N	.81			D	.96	GP	1.28	EC NE
ONION GRAVY	5.54	- .64	17	7	2.43	U	1.04									
TOMATO GRAVY	5.82	- .36	24	1.1	2.15			D	.86							
MAYONNAISE	6.68	.52	53	3	1.87											
CHEESE SAUCE	5.50	- .68	16	13	2.15									SE	.92	NE
CRANBERRY SAUCE	7.03	.85	67	2	1.78			U	.62							
RAISIN SAUCE	5.16	-1.02	10	10	2.24	*		*		*		*			*	
TARTAR SAUCE	5.75	- .43	21	15	2.03											

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SW - Southwest

Northwest and Rocky Mountain Regions omitted because of small N's.

FOODS	MEAN PREFERENCE	DIFFERENCE FROM CLASS MEAN	CENTILE RANK	% NOT TRIED	STANDARD DEVIATION	AGE TREND	AGE RANGE	EDUCATION TREND	EDUCATION RANGE	LENGTH OF SERVICE TREND	LENGTH OF SERVICE RANGE	SIZE OF TOWN TREND	SIZE OF TOWN RANGE	REGION OF ORIGIN HIGH	REGION OF ORIGIN RANGE	REGION OF ORIGIN LOW
E. SPREADS	**6.72**	**.54**														
APPLE BUTTER	6.91	.73	62	2	1.64	D	.93									
PEANUT BUTTER	6.58	.40	49	1	1.90	D	.90									
JAM	7.05	.87	68	8	1.50					D	.80					
JELLY	7.03	.85	67	1	1.49	D	.54			D	.82					
ORANGE MARMALADE	6.03	- .15	29	4	2.13	D	1.93			N	1.37					

Codes for Trend: *Background not analyzed

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TABLE 8.2 Beverages - summary of preferences and their relation to respondents' background

FOODS	MEAN PREFERENCE	DIFFERENCE FROM CLASS MEAN	CENTILE RANK	% NOT TRIED	STANDARD DEVIATION	AGE		EDUCATION		LENGTH OF SERVICE		SIZE OF TOWN		REGION OF ORIGIN		
						TREND	RANGE	TREND	RANGE	TREND	RANGE	TREND	RANGE	HIGH	RANGE	LOW
II. BEVERAGES	7.08															
A. FRUITS	7.48	.40														
APPLE JUICE	7.00	- .08	66	7	1.63	D	1.34			D	.69					
GRAPEFRUIT JUICE	6.99	- .09	66	1	1.92	D	1.14	U	.61	D	.85			NC	.95	EC NE SE
LEMONADE	7.83	.75	93	6	1.34	D	.90									
FROZEN ORANGE JUICE	8.02	.94	96	2	1.22	D	.59									
ORANGEADE	7.52	.44	85	1	1.36	D	1.27									
PINEAPPLE JUICE	7.61	.53	88	0	1.49	D	1.21			D	.86					
TOMATO JUICE	7.42	.34	82	14	1.74											
B. OTHERS	6.79	-.29														
HOT COCOA	7.66	.58	89	2	1.52	D	1.82			D	.77			SW	.85	NC
COFFEE	6.61	- .47	51	3	2.30	*		*		*		*			*	
HOT COFFEE	7.42	.34	82	1	2.06	U	1.19									
ICED COFFEE	4.15	-2.93	2	9	2.64					D	1.13			NE	1.70	SC
SOLUBLE COFFEE	5.16	-1.92	10	18	2.42	*		*		*		*			*	
CHOCOLATE MILK	7.93	.85	94	8	1.39	D	.75									
FRESH MILK	8.60	1.52	100	0	.97	D	.62									
HOT TEA	5.98	-1.10	28	3	2.56			N	.84	N	.83			NE EC	1.30	SC NC
ICED TEA	6.97	- .11	65	6	2.32			U	.72	U	.74			SC	1.46	NE
ICED TEA WITH LEMON AND SUGAR	7.41	.33	82	8	2.12	*		*		*		*			*	

Codes for Trend: *Background not analyzed

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Northwest and Rocky Mountain Regions omitted because of small N's.

TABLE 8.3 Breads - summary of preferences and their relation to respondents' background

FOODS	MEAN PREFERENCE	DIFFERENCE FROM CLASS MEAN	CENTILE RANK	% NOT TRIED	STANDARD DEVIATION	AGE		EDUCATION		LENGTH OF SERVICE		SIZE OF TOWN		REGION OF ORIGIN		
						TREND	RANGE	TREND	RANGE	TREND	RANGE	TREND	RANGE	HIGH	RANGE	LOW
III. BREADS	7.30															
A. SWEET (WITH SUGAR INGREDIENTS)	**7.24**	**-.06**														
RAISIN BREAD	7.17	- .13	73	1	1.80					D	.50					
RAISIN BREAD, SLICED	6.93	- .37	63	3	1.85		*		*		*		*		*	
CINNAMON BUNS	7.66	.36	89	5	1.26	D	1.08									
COFFEE CAKE	7.13	- .17	72	4	1.59							N	.93			
GLAZED RAISED (BREAD) DOUGHNUTS	7.49	.19	84	5	1.49			U	.73							
SUGARED (CAKE) DOUGHNUTS	7.61	.31	88	1	1.22					D	.53					
RAISIN BRAN MUFFINS	6.70	- .60	54	8	1.75	D	.63			D	.57					
B. OTHER BREADS	**7.34**	**.04**														
HOT BISCUITS	8.33	1.03	99	2	.93											
HOT CORNBREAD	7.07	- .23	69	5	1.91					D	.51	D	.51	SC SE	1.27	FC
RYE BREAD, SLICED	6.75	- .55	56	5	1.89		*		*		*		*		*	
RYE BREAD WITH BUTTER	7.07	- .23	69	3	1.88							U	.86	MW NE EC	1.18	SE
WHITE BREAD, SLICED	7.65	.35	89	2	1.13		*		*		*		*		*	
WHOLE WHEAT BREAD SLICED	6.82	- .48	59	2	1.75		*		*		*		*		*	
WHOLE WHEAT BREAD AND BUTTER	7.04	- .26	68	2	1.70					D	.62			SW MW GP	.90	SC SE
PLAIN MUFFINS	6.84	- .46	60	5	1.47											
HARD ROLLS	6.95	- .35	64	4	1.83	U	.74			U	.53			NE	.85	SE
HOT ROLLS	8.40	1.10	99	1	.85											
TOAST	7.81	.51	92	1	1.21											

Codes for Trend: *Background not analyzed

U - Preference increases with increase in factor
D - Preference decreases with increase in factor
N - Variation in preference but no monotonic trend with factor

Code for Region of Origin: NE - New England; EC - East Central; MW - Middle West; NC - North Central; GP - Great Plains; SE - Southeast; SC - South Central; SW - Southwest

Northwest and Rocky Mountain Regions omitted because of small N's.

TABLE 8.4 Cereals - summary of preferences and their relation to respondents' background

FOODS	MEAN PREFERENCE	DIFFERENCE FROM CLASS MEAN	CENTILE RANK	% NOT TRIED	STANDARD DEVIATION	AGE		EDUCATION		LENGTH OF SERVICE		SIZE OF TOWN		REGION OF ORIGIN		
						TREND	RANGE	TREND	RANGE	TREND	RANGE	TREND	RANGE	HIGH	RANGE	LOW
IV. CEREALS	6.25															
A. COLD	**6.53**	**.28**														
CORN FLAKES	7.33	1.08	79	1	1.44											
GRAPENUTS	6.31	.06	38	9	1.93	D	.87			D	.69					
PUFFED RICE (BREAKFAST)	6.21	- .04	35	5	1.94	D	.76									
RICE KRISPIES	6.60	.35	50	9	1.92											
SHREDDED WHEAT	6.19	- .06	34	5	2.04	D	.87			D	.55			SC MW	.98	SE
WHEAT FLAKES	6.54	.29	47	6	1.72											
B. HOT	**5.66**	**-.59**														
HOT COOKED CORNMEAL MUSH	5.04	-1.21	8	13	2.36	D	.98	N	.96	D	1.05	D	.75	SW	1.52	NE
OATMEAL	6.13	- .12	32	2	2.20											
CREAM OF WHEAT	5.80	- .45	23	5	2.21	D	.84									

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SW - Southwest

Northwest and Rocky Mountain Regions omitted because of small N's.

TABLE 8.5 Desserts - summary of preferences and their relation to respondents' background

FOODS	MEAN PREFERENCE	DIFFERENCE FROM CLASS MEAN	CENTILE RANK	% NOT TRIED	STANDARD DEVIATION	AGE		EDUCATION		LENGTH OF SERVICE		SIZE OF TOWN		REGION OF ORIGIN		
						TREND	RANGE	TREND	RANGE	TREND	RANGE	TREND	RANGE	HIGH	RANGE	LOW
V. DESSERTS	7.23															
A. CAKES	**7.26**	**.03**														
APRICOT UPSIDE DOWN CAKE	6.86	- .37	60	11	1.81	D	.67			D	1.08					
BANANA CAKE	7.84	.51	93	5	1.33	D	.68			D	.66					
CAKE SQUARE WITH LEMON SAUCE	6.79	- .44	57	10	1.47	D	.77			D	.60					
CHOCOLATE CAKE	7.67	.44	89	0	1.58	D	1.02			D	1.06					
FRUITCAKE	6.85	- .38	60	21	1.86	*		*		*		*		*		
GINGERBREAD	6.78	- .45	57	6	1.70	D	.93									
GINGERBREAD WITH LEMON SAUCE	7.07	- .16	69	12	1.65	D	.85			D	.79					
JELLY (CAKE) ROLL	7.45	.22	83	2	1.35	D	.68			D	.63					
LEMON CAKE WITH LEMON ICING	7.32	.09	79	3	1.57	D	.69			D	.63					
MAPLE CAKE WITH MARSHMALLOW ICING	7.24	.01	76	18	1.63	D	.72			D	.63					
ORANGE CAKE WITH ORANGE ICING	7.21	- .02	75	9	1.63	D	.79			D	.95					
PEACH SHORT CAKE	7.76	.53	91	10	1.29			U	.58							
PEACH UPSIDE DOWN CAKE	7.54	.31	86	7	1.37					D	.60					

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Northwest and Rocky Mountain Regions omitted because of small N's.

FOODS	MEAN PREFERENCE	DIFFERENCE FROM CLASS MEAN	CENTILE RANK	% NOT TRIED	STANDARD DEVIATION	AGE		EDUCATION		LENGTH OF SERVICE		SIZE OF TOWN		REGION OF ORIGIN		
						TREND	RANGE	TREND	RANGE	TREND	RANGE	TREND	RANGE	HIGH	RANGE	LOW
PINEAPPLE UPSIDE DOWN CAKE	7.69	.46	90	5	1.38	D	.58			D	.57					
PLAIN CAKE WITH CHERRY SAUCE	6.85	- .38	60	8	1.60	D	.64			D	.67					
PLAIN CAKE WITH CHOCOLATE FROSTING	7.47	.24	84	2	1.47	D	1.08			D	.70					
PLAIN CAKE WITH PEANUT BUTTER FROSTING	6.38	- .85	41	11	1.98			D	.85			D	.56			
RAISIN UPSIDE DOWN CAKE	6.89	- .34	61	8	1.76	D	.78			D	.62					
SPICE CAKE	7.16	- .07	73	4	1.52	D	1.20			D	.66					
STRAWBERRY SHORTCAKE	8.32	1.09	99	1	1.01											
B. COOKIES	**7.08**	**-.15**														
BROWNIES	6.99	- .24	66	27	1.69	*		*		*		*		*		
BROWNIES (FUDGE COOKIES)	7.48	.25	84	4	1.36	D	.72			D	.79					
CHOCOLATE CHIP COOKIES	7.61	.38	88	3	1.38	D	.79			D	.85					
MOLASSES COOKIES	6.46	- .77	44	12	1.77											
OATMEAL COOKIES	6.97	- .26	65	6	1.68											
PEANUT BUTTER COOKIES	6.73	- .50	55	8	1.80											
SPICE COOKIES	6.91	- .32	62	5	1.64	D	.81									
SUGAR COOKIES	7.35	.12	80	4	1.34	D	1.28			D	.67					
VANILLA WAFERS	7.18	- .03	74	9	1.46											

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FOOD	MEAN PREFERENCE	DIFFERENCE FROM CLASS MEAN	CENTILE RANK	% NOT TRIED	STANDARD DEVIATION	AGE		EDUCATION		LENGTH OF SERVICE		SIZE OF TOWN		REGION OF ORIGIN		
						TREND	RANGE	TREND	RANGE	TREND	RANGE	TREND	RANGE	HIGH	RANGE	LOW
C. PIES AND COBBLERS	**7.18**	**-.05**														
1. FRUIT	6.93	- .30														
APRICOT COBBLER	5.89	-1.32	25	9	2.18					D	.87	D	.77	SC SW	1.40	NE
CHERRY COBBLER	7.20	- .03	74	15	1.78			U	.87					GP	1.04	NE
PEACH COBBLER	7.33	.10	79	11	1.52			U	.71							
RAISIN COBBLER	5.99	-1.24	28	19	2.07	N	.91			D	.60					
APPLE PIE	7.81	.58	92	1	1.08											
APRICOT PIE	6.16	-1.02	33	3	2.20	N	1.02			D	1.15	D	.72	SC SW	1.07	NE
BERRY PIE	7.43	.20	82	3	1.51	D	.90			D	.68					
CHERRY PIE	7.61	.38	88	1	1.56	D	1.16			D	.78			MW	1.01	NE
MINCE PIE	6.25	- .98	36	4	2.30					D	.99					
PEACH PIE	7.69	.46	90	1	1.47	D	.54			D	.65					
PINEAPPLE PIE	7.47	.24	84	5	1.68	D	.97			D	.87					
PUMPKIN PIE	7.28	.05	77	4	1.97									MW SW GP	1.34	SE
RAISIN PIE	6.00	-1.21	28	3	2.28					D	.93	D	1.16	GP SC	1.06	NE

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FOODS	MEAN PREFERENCE	DIFFERENCE FROM CLASS MEAN	CENTILE RANK	% NOT TRIED	STANDARD DEVIATION	AGE		EDUCATION		LENGTH OF SERVICE		SIZE OF TOWN		REGION OF ORIGIN		
						TREND	RANGE	TREND	RANGE	TREND	RANGE	TREND	RANGE	HIGH	RANGE	LOW
2. CREAM OR MERINGUE	7.64	.41														
BANANA CREAM PIE	8.03	.80	96	7	1.31	D	.82									
BOSTON CREAM PIE	7.71	.48	90	8	1.32	D	.58			D	.56					
BUTTERSCOTCH PIE	7.26	.03	77	7	1.71	D	.93			D	.59	D	.58			
CHOCOLATE CREAM PIE	7.55	.32	86	4	1.68	D	.91			D	.61					
CUSTARD PIE	7.58	.35	87	3	1.51	D	.71							SE	1.48	EC NE
LEMON CREAM PIE	7.89	.66	94	1	1.53	D	.62			D	.69					
LEMON MERINGUE PIE	7.48	.25	84	20	1.69	*		*		*		*			*	
D. ICE CREAMS AND SHERBERTS	**7.63**	**.40**														
CHOCOLATE ICE CREAM	7.56	.33	86	3	1.80	*		*		*		*			*	
ICE CREAM	8.26	1.03	98	1	1.00					D	.64					
STRAWBERRY ICE CREAM	8.05	.82	96	3	1.35	*		*		*		*			*	
ICE CREAM WITH BUTTERSCOTCH SAUCE	7.66	.43	89	6	1.53	D	.80			D	.71					
ICE CREAM WITH CHOCOLATE SAUCE	7.88	.65	94	4	1.31					D	.69					
ICE CREAM SUNDAE	8.24	1.01	98	9	1.08	*		*		*		*			*	
ORANGE SHERBET	6.90	- .33	62	29	1.81	*		*		*		*			*	
SHERBET	6.50	- .73	45	35	1.95	*		*		*		*			*	

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FOODS	MEAN PREFERENCE	DIFFERENCE FROM CLASS MEAN	CENTILE RANK	% NOT TRIED	STANDARD DEVIATION	AGE		EDUCATION		LENGTH OF SERVICE		SIZE OF TOWN		REGION OF ORIGIN		
						TREND	RANGE	TREND	RANGE	TREND	RANGE	TREND	RANGE	HIGH	RANGE	LOW
E. GELATINS	**7.43**	**.20**														
LEMON JELLO WITH LEMON SAUCE	6.91	- .32	62	11	1.75	D	1.27			D	.94					
ORANGE JELLO WITH BANANAS	7.63	.40	88	5	1.46	D	.66									
RASPBERRY JELLO WITH BANANAS	7.64	.41	89	5	1.44	D	.97			D	.61					
RASPBERRY JELLO WITH FRUIT COCKTAIL	7.55	.32	86	4	1.47	D	1.22			D	.76					
F. PUDDINGS AND CUSTARDS	**6.89**	**-.34**														
BAKED CUSTARD	6.92	- .31	63	10	1.80											
APPLE PUDDING	7.16	- .07	73	12	1.59	D	.63			D	.61					
APPLE CRISP PUDDING	6.74	- .49	55	28	1.61	*		*		*		*			*	
BAKED RICE PUDDING	6.10	-1.13	31	2	2.24	N	.90			D	1.04					
BREAD PUDDING	6.42	- .81	42	2	2.03	D	1.12									
BUTTERSCOTCH PUDDING	7.17	- .06	73	4	1.80	D	1.38			D	.84					
CHOCOLATE PUDDING	7.16	- .07	73	3	1.84	D	1.39			D	.91					
PINEAPPLE RICE CREAM PUDDING	6.81	- .42	58	14	1.97	D	.74			D	.94			GP	.93	SW
VANILLA PUDDING	7.04	- .19	68	21	1.64	*		*		*		*			*	
VANILLA PUDDING WITH CHOCOLATE SAUCE	7.42	.19	82	6	1.54	D	1.31			D	.89					

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TABLE 8.6 Fruits - summary of preferences and their relation to respondents' background

FOODS	MEAN PREFERENCE	DIFFERENCE FROM CLASS MEAN	CENTILE RANK	% NOT TRIED	STANDARD DEVIATION	AGE		EDUCATION		LENGTH OF SERVICE		SIZE OF TOWN		REGION OF ORIGIN		
						TREND	RANGE	TREND	RANGE	TREND	RANGE	TREND	RANGE	HIGH	RANGE	LOW
VI. FRUITS	6.94															
A. FRESH	**7.28**	**.34**														
APPLES	7.80	.86	92	0	1.12											
APRICOTS	6.68	- .26	53	2	1.87	D	.83	U	.73	D	.64			SW	1.01	SE NE
CANTALOUP	7.75	.81	91	3	1.74											
CANTALOUP (MUSH MELON OR MUSK MELON)	7.86	.92	93	17	1.67	*		*		*		*			*	
FIGS	5.94	-1.00	27	8	2.26					D	.53	N				
CHILLED FIGS	5.64	-1.30	19	46	2.31	*		*		*		*			*	
GRAPEFRUIT HALF	7.10	.16	70	2	1.89			U	.96	D	.56	U	.63			
FRESH GRAPES (REDDISH, FIRM)	7.66	.72	89	3	1.36											
HONEYDEW MELON	7.17	.23	73	4	1.82											
ORANGES	7.74	.80	91	1	1.29	D	.67			D	.58					
FRESH PEACHES	8.05	1.11	96	1	1.31											
PLUMS	7.03	.09	67	1	1.63	D	.58									
TANGERINES	7.40	.46	81	9	1.51	*		*		*		*			*	
WATERMELON	7.99	1.05	95	2	1.42	D	.77									

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FOODS	MEAN PREFERENCE	DIFFERENCE FROM CLASS MEAN	CENTILE RANK	% NOT TRIED	STANDARD DEVIATION	AGE		EDUCATION		LENGTH OF SERVICE		SIZE OF TOWN		REGION OF ORIGIN		
						TREND	RANGE	TREND	RANGE	TREND	RANGE	TREND	RANGE	HIGH	RANGE	LOW
B. CANNED OR PREPARED	**6.60**	**-.34**														
APPLE SAUCE	7.19	.25	74	2	1.55					D	.65			EC MW	1.02	SC
BAKED APPLE	6.50	- .44	45	4	1.94					D	.70					
STEWED APRICOTS	5.50	-1.44	16	8	2.25					D	.97			SW	1.00	MW
SWEET WHITE CHERRIES	7.04	.10	68	8	1.70	D	.70			D	.66					
FRUIT COCKTAIL	7.88	.94	94	1	1.32	D	.97			D	.80					
CANNED CHILLED FIGS	5.60	-1.34	18	41	2.40	*		*		*		*			*	
PEACHES (CANNED)	7.92	.98	94	7	1.16											
GRAPEFRUIT, CANNED	6.68	- .26	53	3	1.93	*		*		*		*			*	
PEARS (CANNED)	7.63	.69	88	1	1.38											
PINEAPPLE (CANNED)	7.69	.75	90	1	1.42	D	.63			D	.70					
CANNED PLUMS	6.26	- .68	37	15	1.96	*		*		*		*			*	
STEWED PRUNES	5.32	-1.62	13	3	2.00					D	1.06					
STEWED PRUNES, COLD	5.99	- .95	28	11	2.25	*		*		*		*			*	
RHUBARB	5.30	-1.64	12	16	2.47							D	.81	MW	.99	SC SE

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TABLE 8.7 Main dishes - summary of preferences and their relation to respondents' background

FOODS	MEAN PREFERENCE	DIFFERENCE FROM CLASS MEAN	CENTILE RANK	% NOT TRIED	STANDARD DEVIATION	AGE		EDUCATION		LENGTH OF SERVICE		SIZE OF TOWN		REGION OF ORIGIN		
						TREND	RANGE	TREND	RANGE	TREND	RANGE	TREND	RANGE	HIGH	RANGE	LOW
VII. MAIN DISHES	6.60															
A. EGGS AND OMELETS	6.62	-.02														
DEVILED EGGS	6.93	.33	63	7	2.04	U	.80									
FRIED EGGS	7.71	1.11	90	1	1.74	U	1.14				U 1.16					
HARDBOILED EGGS	6.65	.05	52	3	1.86											
COLD HARDBOILED EGGS	6.36	- .24	40	11	2.09		*		*		*		*		*	
SCRAMBLED EGGS	6.43	- .17	43	1	2.13	U	.81							SE	.80	MW GP
SCRAMBLED FRESH EGGS	6.71	.11	54	1	2.09		*		*		*		*		*	
BACON OMELET	6.57	- .03	48	10	1.87			N	.87							
CHEESE OMELET	6.10	- .50	31	8	2.20	N	.80									
PLAIN OMELET	6.16	- .44	33	6	1.98	U	1.28									

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FOODS	MEAN PREFER-ENCE	DIFFER-ENCE FROM CLASS MEAN	CENT-ILE RANK	% NOT TRIED	STAN-DARD DEVIA-TION	AGE		EDUCA-TION		LENGTH OF SERVICE		SIZE OF TOWN		REGION OF ORIGIN		
						TREND	RANGE	TREND	RANGE	TREND	RANGE	TREND	RANGE	HIGH	RANGE	LOW
B. CHEESES AND CHEESE SAND-WICHES	**6.70**	**.10**														
AMERICAN CHEESE	6.73	.13	55	1	1.77											
AMERICAN CHEESE SANDWICH-WHITE BREAD	6.68	.08	53	2	1.82					D	.70					
TOASTED AMERICAN CHEESE SANDWICH	7.32	.72	79	28	1.73	*		*		*		*			*	
TOASTED AMERICAN CHEESE SANDWICH-WHITE BREAD	7.15	.55	72	3	1.71											
COTTAGE CHEESE	6.03	- .57	29	2	2.52					N	1.15			SW	1.66	NE
SWISS CHEESE	6.28	- .32	37	3	2.05											
C. CEREAL LIGHT MAIN DISHES	**6.34**	**- -.26**														
CORN FRITTERS	6.27	- .33	37	12	1.98			D	.66					SC SE	.88	MW
HOT GRIDDLE CAKES	7.05	.45	68	2	1.77					D	.95					
FRIED CORNMEAL MUSH	4.81	-1.79	6	22	2.38			D	1.07	D	.96	D	1.02	SE SW	1.83	NE
FRENCH TOAST	7.24	.64	76	2	1.77	N	.97			D	1.05					

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FOODS	MEAN PREFER-ENCE	DIFFER-ENCE FROM CLASS MEAN	CENT-ILE RANK	% NOT TRIED	STAN-DARD DEVIA-TION	AGE		EDUCA-TION		LENGTH OF SERVICE		SIZE OF TOWN		REGION OF ORIGIN		
						TREND	RANGE	TREND	RANGE	TREND	RANGE	TREND	RANGE	HIGH	RANGE	LOW
D. MEATS	**6.61**	**.10**														
1. BEEF	6.82	.22														
BARBEQUED BEEF ON BUN	7.65	1.05	89	10	1.36											
BOILED BEEF WITH VEGETABLES (CARROTS, ONIONS, POTATOES)	6.76	.16	56	1	1.83					D	.90					
CORNED BEEF	6.08	- .52	31	1	2.41	N	1.37			D	1.92			SW	1.02	GP
CORNED BEEF AND CABBAGE	5.71	- .89	20	13	2.40	*		*		*		*			*	
BOILED CORNED BEEF, CABBAGE AND POTATOES	5.83	- .77	24	1	2.55			N	.80	D	1.87			NE	1.38	SC
BAKED CORNED BEEF HASH WITH EGG	5.76	- .84	22	15	2.30					D	1.15			SW	.89	EC
CREAMED DRIED BEEF ON TOAST	5.09	-1.51	9	6	2.64	*		*		*		*			*	
CREAMED DRIED (CHIPPED) BEEF ON TOAST	6.08	- .52	31	8	2.37			D	.81	D	.64					
CREAMED FRESH BEEF ON TOAST	6.41	- .19	42	5	2.37			D	1.19	D	.65					
BEEF POT PIE WITH MASHED POTATO TOPPING	7.18	.58	74	11	1.62											
ROAST BEEF	8.02	1.42	96	1	1.17											
POT ROAST OF BEEF	7.74	1.14	91	3	1.32	*		*		*		*			*	
POT ROAST OF BEEF WITH BROWN GRAVY	7.90	1.30	94	1	1.18											
GRILLED STEAK	8.31	1.71	99	1	1.05			U	.75							
SWISS STEAK	7.92	1.32	94	4	1.22									GP	1.00	SC NE
BEEF STEW	6.73	.13	55	0	2.01					D	1.03					
BEEF STEW WITH NOODLES	6.76	.16	56	1	2.06					D	1.23					

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FOODS	MEAN PREFER-ENCE	DIFFER-ENCE FROM CLASS MEAN	CENT-ILE RANK	% NOT TRIED	STAN-DARD DEVIA-TION	AGE		EDUCA-TION		LENGTH OF SERVICE		SIZE OF TOWN		REGION OF ORIGIN		
						TREND	RANGE	TREND	RANGE	TREND	RANGE	TREND	RANGE	HIGH	RANGE	LOW
2. HAMS	7.14	.54														
BAKED HAM, SUGAR-CURED	7.68	1.08	90	4	1.44											
BRAISED HAM STEAK AND PINEAPPLE SLICES	7.46	.86	83	4	1.30											
DICED HAM AND CABBAGE	6.15	- .45	33	4	2.09			D	.92							
GRILLED HAM	7.60	1.00	87	2	1.33											
HAM A LA KING OVER HOT CORN BREAD	6.58	- .02	49	22	2.05	D	.84			D	.98					
HAM LOAF	7.15	.55	72	5	1.64	D	.68	D	1.03			D	.74			
HAM SLICES WITH SCALLOPED POTATOES	7.37	.77	80	3	1.49											
3. OTHER PORK PRODUCTS	7.41	.81														
BACON	7.45	.85	83	1	1.61									SE	1.01	NE
BREADED PORK CHOPS	7.46	.86	83	3	1.52											
GRILLED PORK CHOPS	7.83	1.23	93	1	1.39											
ROAST PORK	7.72	1.12	90	0	1.36											
ROAST PORK WITH FRIED APPLE RINGS	7.12	.52	71	10	1.62											
BARBEQUED SPARERIBS	6.89	.29	61	3	2.06					D	.76			SC SE SW	1.23	NE
4. LAMB	6.04	- .56														
LAMB PATTIES	5.55	-1.05	17	20	2.36	D	2.13			D	1.57					
LAMB STEW	5.79	- .81	23	6	2.39	D	2.42			D	1.92					
ROAST LAMB	6.13	- .47	32	6	2.48	D	2.53			D	1.85	U	1.19	NE	2.05	GP
SHOULDER LAMB CHOPS	6.71	.11	54	2	2.43	D	2.10			D	1.80	U	.91	NE	1.32	SC

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FOODS	MEAN PREFER ENCE	DIFFER- ENCE FROM CLASS MEAN	CENT- ILE RANK	% NOT TRIED	STAN DARD DEVIA- TION	AGE		EDUCA TION		LENGTH OF SERVICE		SIZE OF TOWN		REGION OF ORIGIN		
						TREND	RANGE	TREND	RANGE	TREND	RANGE	TREND	RANGE	HIGH	RANGE	LOW
5. VEAL	6.92	.32														
BREADED VEAL CUTLET	7.60	1.00	87	5	1.56	U	.70									
ROAST VEAL WITH DRESSING	7.34	.74	79	6	1.63			U	.54							
VEALBURGER	6.74	.14	55	12	1.79											
VEAL STEW	6.02	- .58	29	7	2.14	D	.69			D	.82					
6. LIVER	5.87	.73														
GRILLED LIVER WITH BACON	5.63	- .97	19	9	2.65					D	.84	D	.85	SW SE SC	.89	MW
GRILLED LIVER W/ SMOTHERED ONIONS	6.11	- .49	32	1	2.75	U	.71			D	.61					
7. MEAT COMBINATIONS	5.98	- .62														
BAKED HASH	5.32	-1.28	13	5	2.31			N	.96	D	1.07			SE	.80	EC
CHILI CON CARNE	6.61	.01	51	8	1.96									SW	1.62	NE
CHOP SUEY	6.36	- .24	40	11	2.44	*		*		*		*			*	
CHOP SUEY WITH SOY SAUCE	5.52	-1.08	16	49	2.45	*		*		*		*			*	
CHOW MEIN	5.71	- .89	20	25	2.36							U	.65			
MEAT AND VEGETABLE PIE (DOUBLE CRUST)	6.36	- .24	40	9	1.82					D	.75					

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FOODS	MEAN PREFERENCE	DIFFERENCE FROM CLASS MEAN	CENTILE RANK	% NOT TRIED	STANDARD DEVIATION	AGE		EDUCATION		LENGTH OF SERVICE		SIZE OF TOWN		REGION OF ORIGIN		
						TREND	RANGE	TREND	RANGE	TREND	RANGE	TREND	RANGE	HIGH	RANGE	LOW
8. COLD CUTS AND SAUSAGES	6.32	- .28														
BOLOGNA	6.25	- .35	36	7	1.86											
COLD CUTS	5.93	- .67	26	4	1.90					D	.88					
LIVERWURST	5.66	- .94	19	11	2.37											
SALAMI	5.98	- .62	28	8	2.20					D	.52					
BEEF SAUSAGE	6.11	- .49	32	16	2.23	*		*		*		*			*	
SAUSAGE CAKES	6.91	.31	62	6	1.89							D	.63	NC SE	1.17	NE
GRILLED SAUSAGE LINKS (BREAKFAST)	6.89	.29	61	2	1.46	U	.95							NC SE	1.14	NE
GRILLED VIENNA SAUSAGE	6.82	.22	59	4	1.90	D	.52									
9. FRANKFURTERS	6.50	- .10														
FRANKFURTERS	6.52	- .08	46	2	1.84	*		*		*		*			*	
FRANKFURTERS BOILED	6.04	- .56	29	2	2.15	*		*		*		*			*	
GRILLED FRANKFURTERS	6.66	.06	52	2	1.99									GP	.90	NE
STEAMED FRANKFURTERS	6.94	.34	64	1	1.73	D	.88			D	.58	N	1.13			
FRANKFURTERS WITH BAKED BEANS	5.78	- .82	22	3	2.24	*		*		*		*			*	
FRANKFURTERS WITH BARBEQUE SAUCE	7.04	.44	68	2	1.68	D	.96									
FRANKFURTERS BAKED IN BISCUIT DOUGH	6.55	- .05	48	21	1.97	D	.84									

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FOODS	MEAN PREFERENCE	DIFFERENCE FROM CLASS MEAN	CENTILE RANK	% NOT TRIED	STANDARD DEVIATION	AGE		EDUCATION		LENGTH OF SERVICE		SIZE OF TOWN		REGION OF ORIGIN		
						TREND	RANGE	TREND	RANGE	TREND	RANGE	TREND	RANGE	HIGH	RANGE	LOW
10. GROUND MEATS	7.13	.53														
CHEESEBURGER	7.52	.92	85	4	1.50	D	1.01									
GROUND MEAT BAKED IN BISCUIT ROLL	6.86	.26	60	14	1.69											
BAKED HAMBURGER STEAK	7.50	.90	84	1	1.40	D	.78									
SPAGHETTI AND MEAT BALLS	7.47	.87	84	1	1.62	D	.54							SW	1.49	NC
SWEDISH MEATBALLS WITH BROWN ONION GRAVY	6.95	.35	64	9	1.80											
MEAT LOAF	7.20	.60	74	1	1.82	D	1.03			D	.58	N	1.40			
MEAT LOAF WITH CREOLE SAUCE	7.05	.45	68	2	1.73	D	.93			D	.71					
STUFFED GREEN PEPPERS WITH BROWN GRAVY	6.47	- .13	44	3	2.45	N	1.01			U	.83	U	.74			
11. FOWL	7.42	.82														
BAKED CHICKEN AND NOODLES	7.31	.71	78	5	1.56											
CHICKEN A LA KING ON TOAST	7.02	.42	67	3	1.95					D	.58					
CHICKEN PIE WITH BISCUIT CRUST	7.12	.52	71	10	1.87											
CHICKEN SALAD	7.34	.74	79	2	1.71											
CHICKEN STEW OVER STEAMED RICE	6.22	- .38	35	6	2.17											
FRIED CHICKEN	8.24	1.64	98	0	1.24									SW SE	1.23	GP
ROAST CHICKEN WITH DRESSING	7.99	1.39	95	1	1.32											
ROAST TURKEY	8.13	1.53	97	4	1.19											

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FOODS	MEAN PREFERENCE	DIFFERENCE FROM CLASS MEAN	CENTILE RANK	% NOT TRIED	STANDARD DEVIATION	AGE		EDUCATION		LENGTH OF SERVICE		SIZE OF TOWN		REGION OF ORIGIN		
						TREND	RANGE	TREND	RANGE	TREND	RANGE	TREND	RANGE	HIGH	RANGE	LOW
12. FISH	5.59	-1.01														
CODFISH CAKES	4.88	-1.72	6	11	2.50	D	1.17			D	.97			SE NE	1.15	MW
BAKED FISH	4.58	-2.02	4	3	2.56	*		*		*		*			*	
BAKED FISH WITH DRESSING	5.30	-1.30	12	2	2.61	D	1.69			D	1.96					
BAKED FISH WITH TOMATO SAUCE	5.28	-1.32	12	2	2.35	D	.91			D	1.67			SW	1.02	NE MW
FRIED FISH	5.42	-1.18	14	1	2.52	D	.50	D	.83	D	1.31			SE	.93	EC
SALMON CAKES	6.06	- .54	30	6	2.24	D	.98	D	1.14	D	.83			SE	1.78	NE
SALMON SALAD	6.05	- .55	30	6	2.20			D	.68	D	.54					
CREAMED SALMON (ON TOAST OR BISCUIT)	5.63	- .97	19	6	2.32			D	.79					SE	.85	GP EC
SARDINES	5.59	-1.01	18	3	2.43									SE NE	.91	GP
TUNA FISH SALAD	6.40	- .20	42	3	2.16											
BAKED TUNA AND NOODLES	5.88	- .72	25	16	2.22					D	.51					
CREAMED TUNA ON BISCUITS	6.31	- .29	38	7	2.18					D	.89					
BAKED WHITE FISH WITH TOMATO SAUCE	5.29	-1.31	12	9	2.48	*		*		*		*			*	

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TABLE 8.8 Potatoes and starches - summary of preferences and their relation to respondents' background

FOODS	MEAN PREFERENCE	DIFFERENCE FROM CLASS MEAN	CENTILE RANK	% NOT TRIED	STANDARD DEVIATION	AGE		EDUCATION		LENGTH OF SERVICE		SIZE OF TOWN		REGION OF ORIGIN		
						TREND	RANGE	TREND	RANGE	TREND	RANGE	TREND	RANGE	HIGH	RANGE	LOW
VIII. POTATOES AND STARCHES	6.62															
A. BAKED BEANS	**6.14**	**-.48**														
BAKED BEANS	6.17	- .45	34	2	2.05	*		*		*		*			*	
BAKED BEANS HOMEMADE WITH MOLASSES	6.23	- .39	36	6	2.21					N	.82			MW NE	.91	SW
BAKED KIDNEY BEANS	5.93	- .69	26	4	2.16							D	1.01			
BAKED (NAVY) BEANS WITH TOMATO SAUCE	6.21	- .41	35	4	2.10											
B. MACARONI, NOODLES AND SPAGHETTI	**6.56**	**-.06**														
BAKED MACARONI AND CHEESE	6.65	.03	52	3	1.84											
MACARONI SALAD	6.13	- .49	32	8	2.16											
BUTTERED NOODLES	6.18	- .44	34	8	2.04											
SPAGHETTI WITH TOMATO SAUCE	7.30	.68	78	2	1.80	D	.91							EC NE SW	.88	SE

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FOODS	MEAN PREFER-ENCE	DIFFER-ENCE FROM CLASS MEAN	CENT-ILE RANK	% NOT TRIED	STAN-DARD DEVIA-TION	AGE		EDUCA-TION		LENGTH OF SERVICE		SIZE OF TOWN		REGION OF ORIGIN		
						TREND	RANGE	TREND	RANGE	TREND	RANGE	TREND	RANGE	HIGH	RANGE	LOW
C. WHITE POTATOES	**7.00**	**.38**														
BAKED WHITE POTATOES	6.73	.11	55	1	1.84									NE	.85	SC
COLD POTATO SALAD	7.11	.49	71	2	1.76											
CREAMED POTATOES	6.93	.31	63	2	1.68							D	.68	SE SC	1.27	NE
FRENCH FRIED POTATOES	8.17	1.55	97	1	1.11											
HASH-BROWNED POTATOES	7.11	.49	71	2	1.51											
HOT POTATO SALAD	6.38	- .24	41	8	2.07	D	1.11	D	1.10	D	.63			SC	.90	NE EC SW
MASHED POTATOES	7.56	.94	86	1	1.53	*		*		*		*			*	
MASHED WHITE POTATOES	7.81	1.19	92	1	1.43											
OVEN BROWNED POTATOES	7.12	.50	71	2	1.58											
PARSLEYED POTATOES	6.56	- .06	48	6	1.87											
PARSLEYED POTATOES WITH MELTED BUTTER	7.01	.39	66	9	1.65	*		*		*		*			*	
POTATOES BOILED IN SKIN	5.76	- .86	22	4	2.09											
POTATO CAKES (FRIED OR BAKED PATTIES OF MASHED POTATOES)	6.76	.14	56	9	1.82											
POTATO CHIPS	7.45	.83	83	4	1.40											
POTATOES FRIED WITH ONIONS	6.89	.27	61	2	2.03									SW	.90	GP
SCALLOPED POTATOES (BAKED WITH CREAM SAUCE)	6.65	.03	52	1	1.76							D	.86	NC	.82	NE EC

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FOODS	MEAN PREFERENCE	DIFFERENCE FROM CLASS MEAN	CENTILE RANK	% NOT TRIED	STANDARD DEVIATION	AGE		EDUCATION		LENGTH OF SERVICE		SIZE OF TOWN		REGION OF ORIGIN		
						TREND	RANGE	TREND	RANGE	TREND	RANGE	TREND	RANGE	HIGH	RANGE	LOW
D. RICES	**5.47**	**-1.15**														
BAKED RICE AND CHEESE	4.97	-1.65	7	19	2.41	D	.65			D	1.20			SW	1.00	GP NE MW
SPANISH RICE (RICE WITH TOMATO, BACON AND PEPPER)	5.92	- .70	26	10	2.39					D	1.00	U	.66	SW	1.38	NE GP
STEAMED RICE	5.52	-1.10	16	1	2.49					D	.76	U	.69	SW	1.18	NE
E. SWEET POTATOES	**6.53**	**-.09**														
BAKED SWEET POTATOES	6.75	.13	56	1	2.30	U	.70							SE	1.84	NE
CANDIED SWEET POTATOES	6.54	- .08	47	2	2.38					D	.56			SE SC	2.09	NE
FRIED SWEET POTATOES	6.51	- .11	46	3	2.26									SE	1.47	NE
MASHED SWEET POTATOES	6.71	.09	54	1	2.16					D	.70			SE	.93	GP NE
SWEET POTATOES BAKED WITH APPLE AND HAM	6.88	.26	61	7	2.17					D	.57			SE	1.33	NE
SWEET POTATOES BOILED IN SKINS	5.80	- .82	23	5	2.48					D	.78			SE	1.05	NE MW

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TABLE 8.9 Salads - Summary of preferences and their relation to respondents' background

FOODS	MEAN PREFERENCE	DIFFERENCE FROM CLASS MEAN	CENTILE RANK	% NOT TRIED	STANDARD DEVIATION	AGE		EDUCATION		LENGTH OF SERVICE		SIZE OF TOWN		REGION OF ORIGIN		
						TREND	RANGE	TREND	RANGE	TREND	RANGE	TREND	RANGE	HIGH	RANGE	LOW
IX. SALADS	6.20															
A. FRUIT	**6.78**	**.58**														
APPLE AND GRAPEFRUIT SALAD	6.20		35	8	1.94	D	.70			D	1.27					
APPLE AND RAISIN SALAD	5.92	- .28	26	7	2.12	D	.60			D	.70	D	.89	SE	1.24	NE
APRICOT, GRAPEFRUIT AND PEAR SALAD	6.54	.34	47	6	1.93	N	.93			D	1.21			MW SW GP	.83	NE
BANANA, ORANGE AND GRAPEFRUIT SALAD	7.10	.90	70	6	1.69	D	.62			D	.97					
GRAPEFRUIT, BANANA AND ORANGE SALAD	7.04	.84	68	6	1.86					D	1.00					
FRUIT COCKTAIL ON LETTUCE	7.27	1.07	77	4	1.66					D	.78					
JELLIED FRUIT SALAD	6.99	.79	66	2	1.84					D	.73					
ORANGE AND GRAPEFRUIT SALAD	6.51	.31	46	6	1.92			U	.91	D	1.00					
PEACH GELATIN SALAD ON LETTUCE	6.52	.32	46	14	1.93	*		*		*		*			*	
PEACH GELATIN SALAD ON LETTUCE (JELLIED FRUIT SALAD)	7.10	.90	70	11	1.75	*		*		*		*			*	
PINEAPPLE, APRICOT AND BANANA SALAD	7.42	1.22	82	6	1.46	D	.66			D	.83			SW	.94	NE

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FOODS	MEAN PREFERENCE	DIFFERENCE FROM CLASS MEAN	CENTILE RANK	% NOT TRIED	STANDARD DEVIATION	AGE		EDUCATION		LENGTH OF SERVICE		SIZE OF TOWN		REGION OF ORIGIN		
						TREND	RANGE	TREND	RANGE	TREND	RANGE	TREND	RANGE	HIGH	RANGE	LOW
B. VEGETABLE	**5.94**	**-.26**														
CABBAGE AND GREEN PEPPER SLAW	5.68	- .52	20	5	2.31	U	.77									
CABBAGE SLAW	6.26	.06	37	2	2.23	U	.98							SE GP	1.13	SW
CARDINAL SALAD (COOKED GREEN BEANS,TOMATOES, CELERY,ONIONS)	6.10	- .10	31	15	1.96			D	.61							
CHILLED ASPARAGUS SALAD WITH FRENCH DRESSING	4.44	-1.76	3	10	2.56	U	.11							SW	1.43	GP
CHOPPED FRESH GREEN VEGETABLE SALAD WITH FRENCH DRESSING	6.97	.77	65	2	1.80					U	.50					
COLESLAW	6.76	.56	56	5	1.90	*		*		*		*			*	
COLE SLAW WITH SOUR CREAM DRESSING	5.65	- .55	19	5	2.34	U	.76					D	.62	SE	1.38	SW
CUCUMBER AND ONION SALAD WITH VINEGAR	6.27	.07	37	3	2.42	N	1.01			U	.80					
KIDNEY BEAN SALAD	4.87	-1.33	6	18	2.28	U	.88	D	.80			N	1.01	GP	1.91	NE
LETTUCE WEDGES	6.69	.49	53	4	1.79	U	.59			U	.53					
LETTUCE WITH VINEGAR AND BACON DRESSING	6.36	.16	40	7	2.12											
PERFECTION SALAD (JELLIED CABBAGE, CELERY,CARROTS)	4.99	-1.21	8	11	2.34									NC	1.16	NE
PICKLED BEET SALAD	5.28	- .92	12	4	2.38											
SLICED CUCUMBERS	6.48	.28	45	9	2.27					U	.64			NE	1.01	MW
SHREDDED CARROT AND LETTUCE SALAD	5.68	- .52	20	2	3.43											
TOMATO AND CUCUMBER SALAD	6.49	.29	45	12	2.20	U	.79			U	.70			NE	.92	GP

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FOODS	MEAN PREFERENCE	DIFFERENCE FROM CLASS MEAN	CENTILE RANK	% NOT TRIED	STANDARD DEVIATION	AGE		EDUCATION		LENGTH OF SERVICE		SIZE OF TOWN		REGION OF ORIGIN		
						TREND	RANGE	TREND	RANGE	TREND	RANGE	TREND	RANGE	HIGH	RANGE	LOW
C. COMBINATION	**6.02**	**-.18**														
APPLE AND CELERY SALAD	6.17	- .03	34	6	2.03					D	.58			SW MW	.84	NE
APRICOT AND COTTAGE CHEESE SALAD	5.89	- .31	25	7	2.38					D	.68			SW	1.85	NE
CABBAGE, APPLE AND RAISIN SALAD	5.49	- .71	16	7	2.26					D	.68	D	.90	NC	.90	NE
CABBAGE AND PINEAPPLE SALAD	5.71	- .49	20	8	2.21					D	.81					
CARROT AND RAISIN SALAD	5.04	-1.16	8	3	2.47									SW	1.16	NE EC
GRATED CARROT AND PINEAPPLE SALAD	5.87	- .33	25	7	2.18			U	.77	D	1.00			SW	1.19	SC
PEACH AND COTTAGE CHEESE SALAD	6.44	.24	43	3	2.31									SC	2.45	NE
PEARS WITH COTTAGE CHEESE	6.45	.25	44	3	2.29	U	.59							SW	1.62	NE
PINEAPPLE AND COTTAGE CHEESE SALAD	6.34	.14	39	3	2.28									SW	1.66	NE
PINEAPPLE RING WITH GRATED AMERICAN CHEESE ON LETTUCE	6.70	.50	54	9	1.92					D	.63			SW	1.29	NE
TOMATO AND COTTAGE CHEESE SALAD	6.08	- .12	31	8	2.24									SW	1.54	NE

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TABLE 8.10 Soups - summary of preferences and their relation to respondents' background

FOODS	MEAN PREFERENCE	DIFFERENCE FROM CLASS MEAN	CENTILE RANK	% NOT TRIED	STANDARD DEVIATION	AGE		EDUCATION		LENGTH OF SERVICE		SIZE OF TOWN		REGION OF ORIGIN		
						TREND	RANGE	TREND	RANGE	TREND	RANGE	TREND	RANGE	HIGH	RANGE	LOW
X. SOUPS	5.99															
CORN CHOWDER	5.44	- .55	15	26	2.10							D	.87	SW	.93	EC
POTATO CHOWDER	5.82	- .17	24	21	2.01			D	.84					SW	.93	EC
BEAN SOUP	5.96	- .03	27	4	2.13	U	1.13	D	.91	N	.90			GP	1.36	NE
BEEF SOUP WITH TOMATOES, ONIONS, GREEN PEPPERS AND SPAGHETTI	6.85	.86	60	6	1.87											
CREAM OF CELERY SOUP	5.07	- .92	9	15	2.30	U	1.71									
CHICKEN NOODLE SOUP	6.71	.72	54	3	1.72	U	1.01									
CHICKEN RICE SOUP	6.55	.56	48	5	2.03							U	.74	SW	1.17	GP
MUSHROOM SOUP	5.11	- .88	9	17	2.63	U	1.58	U	.82	N	.84			SW	1.15	GP
ONION SOUP (BROTH TYPE)	4.59	-1.40	4	10	2.48	U	.72			N	.81			SW	1.23	GP
SPLIT PEA SOUP	5.67	- .32	19	5	2.34	U	.73			N	.85			SW	.87	GP
CREAM OF TOMATO SOUP	6.88	.89	61	3	1.90											
TOMATO SOUP	6.22	.23	35	11	2.04	*		*		*		*			*	
VEGETABLE SOUP	7.02	1.03	67	2	1.65	U	.63									

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TABLE 8.11 Vegetables -summary of preferences and their relation to respondents' background

FOODS	MEAN PREFERENCE	DIFFERENCE FROM CLASS MEAN	CENTILE RANK	% NOT TRIED	STANDARD DEVIATION	AGE		EDUCATION		LENGTH OF SERVICE		SIZE OF TOWN		REGION OF ORIGIN		
						TREND	RANGE	TREND	RANGE	TREND	RANGE	TREND	RANGE	HIGH	RANGE	LOW
XI. VEGETABLES	5.52															
A. FLOWERS, FRUITS AND SEEDS	5.94	.42														
BUTTERED GREEN BEANS (CANNED)	6.80	1.28	58	3	1.64											
BUTTERED (FRESH) GREEN BEANS	6.90	1.38	62	3	1.74											
BUTTERED GREEN STRING BEANS	7.11	1.59	71	1	1.63											
GREEN (STRING) BEANS WITH BACON	6.37	.85	41	2	2.01									SE GP	.84	NE
BOILED LIMA BEANS	6.25	.73	36	2	2.12	U	.78	D	.87					SE	1.78	NE
BUTTERED GREEN LIMA BEANS	6.81	1.29	58	1	1.95									SE	1.60	NE
LIMA BEANS BOILED WITH HAM HOCKS	6.28	.76	37	6	2.11	N	.81	D	.95	D	.70	N	.91	SE	2.30	NE
BUTTERED YELLOW WAX BEANS	5.85	.33	24	15	2.06	*		*		*		*		*		
BROCCOLI	4.56	- .96	4	16	2.49	U	.94	N	.87	D	.55	U	.86	SW NE	.88	SC MW
BROCCOLI WITH CHEESE SAUCE	4.85	- .67	6	30	2.45			N	.93	D	.76			SW	.82	NE
BROCCOLI WITH HOT LEMON SAUCE	5.17	- .35	10	38	2.41	*		*		*		*			*	
BUTTERED BROCCOLI	5.59	.07	18	29	2.37	*		*		*		*			*	

Codes for Trend: *Background not analyzed

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FOODS	MEAN PREFERENCE	DIFFERENCE FROM CLASS MEAN	CENTILE RANK	% NOT TRIED	STANDARD DEVIATION	AGE		EDUCATION		LENGTH OF SERVICE		SIZE OF TOWN		REGION OF ORIGIN		
						TREND	RANGE	TREND	RANGE	TREND	RANGE	TREND	RANGE	HIGH	RANGE	LOW
BUTTERED CAULIFLOWER	4.68	- .84	5	3	2.11	U	1.94	U	.94	D	1.05	U	.73	NC	1.61	SC
CAULIFLOWER WITH CHEESE SAUCE	4.09	-1.43	1	12	2.52	U	1.27	N	.88	D	.81			SW	1.44	NC
BUTTERED WHOLE KERNEL CORN	7.20	1.68	74	9	1.72											
CREAMED CORN	6.89	1.37	61	2	1.72											
FRESH BUTTERED CORN ON COB	8.03	2.51	96	1	1.37											
STEWED CORN WITH BACON AND PEPPERS	6.28	.76	37	9	2.08									SC	1.35	NC NE
FRENCH FRIED EGGPLANT	5.34	- .18	13	9	2.72	U	1.68			U	1.08	D	.64	SE SC	1.67	NC
BUTTERED HOMINY	5.48	- .04	16	23	2.38			D	1.07			N	.86	SC SE	1.31	NE
FRIED HOMINY GRITS	5.27	- .25	12	22	2.50			D	1.03			N	.96	SE SC	1.35	EC NE
OKRA	5.35	- .17	13	40	2.64			D	1.17			N	1.01	SE	1.37	EC
BLACKEYED PEAS	5.93	.41	26	7	2.42			N	.84			D	1.30	SC	2.40	NE
BUTTERED GREEN PEAS	6.99	1.47	66	1	1.76											
BAKED HUBBARD SQUASH	4.52	-1.00	3	19	2.48					D	.90	D	.79	NE	1.25	EC
FRIED SUMMER SQUASH	5.04	- .48	8	10	2.41	U	.81					D	1.14	SE SW	1.32	GP EC
MASHED SQUASH	4.66	- .86	5	7	2.54			N	.88	D	.94	D	.86	NE NC	1.41	EC
FRESH GRILLED TOMATOES	6.36	.84	40	12	2.17			D	.67					NE	.91	MW
FRESH SLICED TOMATOES	7.90	2.38	94	1	1.26											
STEWED TOMATOES	5.67	.15	19	4	2.21			N	.82							

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FOODS	MEAN PREFERENCE	DIFFERENCE FROM CLASS MEAN	CENTILE RANK	% NOT TRIED	STANDARD DEVIATION	AGE		EDUCATION		LENGTH OF SERVICE		SIZE OF TOWN		REGION OF ORIGIN		
						TREND	RANGE	TREND	RANGE	TREND	RANGE	TREND	RANGE	HIGH	RANGE	LOW
B. LEAVES AND STEMS	**4.96**	**-.56**														
ASPARAGUS WITH HOLLANDAISE SAUCE	4.20	-1.32	2	17	2.46	U	1.40	N	.81	D	.81	U	.66	SW	1.15	SC SE
BUTTERED ASPARAGUS	4.86	- .66	6	4	1.99	U	1.90	N	.98	D	.86	U	.92	NE	1.43	SE SC
CREAMED ASPARAGUS	4.47	-1.05	3	4	3.06	U	1.94	N	.86	D	.91	U	.69	SW	1.28	SE SC
BRUSSELS SPROUTS	4.83	- .69	6	10	2.57	U	1.48			N	.95	U	.56	SW NE	.87	NC SC GP
BUTTERED BOILED CABBAGE	5.48	- .04	16	4	2.36									NE	.93	GP SW
CABBAGE BAKED WITH CHEESE	4.30	-1.22	2	30	2.41			N	.93	D	.70			SE	.94	NE
SWEET SOUR CABBAGE (SUGAR AND VINEGAR)	5.25	- .27	11	9	2.41	U	.53	D	.66			D	.63	SE	.92	NE SW
BRAISED CELERY	5.64	.12	19	27	2.23	*		*		*		*			*	
SIMMERED LEAFY GREENS	4.99	- .53	8	6	2.38	U	1.10			D	.63			SE	1.62	NC
TURNIP GREENS AND BACON	5.40	- .12	14	7	2.50	U	.74	D	.04			D	1.08	SE	2.16	NE
SAUERKRAUT	5.68	.16	20	6	2.40			N	.85					EC	1.20	NE
BUTTERED SPINACH WITH HARD COOKED EGG	4.83	- .69	6	5	2.56	U	1.05					U	.67	SW	1.46	EC NC
SPINACH BAKED WITH CHEESE	4.71	- .81	5	24	2.58					D	1.33			SW	1.17	SC
SPINACH WITH CHEESE SAUCE	4.73	- .79	5	37	2.55	*		*		*		*			*	

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FOODS	MEAN PREFERENCE	DIFFERENCE FROM CLASS MEAN	CENTILE RANK	% NOT TRIED	STANDARD DEVIATION	AGE		EDUCATION		LENGTH OF SERVICE		SIZE OF TOWN		REGION OF ORIGIN		
						TREND	RANGE	TREND	RANGE	TREND	RANGE	TREND	RANGE	HIGH	RANGE	LOW
C. ROOTS AND BULBS	**5.11**	**-.41**														
HARVARD BEETS (THICKENED VINEGAR SAUCE)	5.46	- .06	15	7	2.33									NE	1.07	SC
HOT SPICED BEETS	4.96	- .56	7	4	2.42										*	
BUTTERED CARROTS	6.12	.60	32	9	2.18	*		*		*		*				
CANDIED CARROTS	5.32	- .20	13	11	2.47									SW	1.01	SE
CREAMED FRESH CARROTS	5.92	.40	26	4	2.13	D	.85			D	.62			NE	1.17	SE
FRENCH FRIED ONIONS	5.77	.25	22	4	2.57	U	1.40			D	.79					
SCALLOPED ONIONS	5.29	- .23	12	6	2.45	U	1.01			D	.76			NE	.94	SW
CANDIED PARSNIPS	4.06	-1.46	1	19	2.34											
FRIED PARSNIPS	4.47	-1.05	3	29	2.31	N	.96	N	.88					SW	.80	MW
BUTTERED DICED RUTABAGAS	4.74	- .78	5	39	2.34							N	.81			
BUTTERED TURNIPS	5.01	- .51	8	11	2.49			N	1.10							
DICED BUTTERED TURNIPS	4.72	- .80	5	8	2.46	*		*		*		*			*	
MASHED TURNIPS	4.57	- .95	4	10	2.52			D	1.35					SE NE	1.25	GP
D. COMBINATIONS	**5.59**	**.07**														
ESCALLOPED EGGPLANT AND TOMATOES	4.75	- .77	5	11	2.50			D	1.17	U	.84			SE	1.34	GP
CREAMED PEAS AND CARROTS	6.36	.84	40	2	2.02									NC	.91	SC SE
SUCCOTASH LIMA BEANS AND WHOLE KERNEL CORN	6.29	.77	38	7	2.08									SE	1.34	NE
SUCCOTASH	5.51	- .01	16	27	2.25	*		*		*		*			*	
SUCCOTASH (CREAMED CORN WITH LIMA BEANS)	5.92	.40	26	8	2.14	*		*		*		*			*	
SUMMER SQUASH WITH TOMATOES AND ONIONS	4.72	- .80	5	15	2.48			N	1.15			D	1.25	SW	1.61	GP

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Chapter 9

PREFERENCE IN RELATION TO FOOD CLASS

Many interesting contrasts and comparisons can be made between individual foods or between food classes and subclasses. The data in Tables 8.1 through 8.11 permit preference comparisons among foods within a class (beverages, bread, desserts, main dishes, etc.) or between classes. These data have been used, for example, to show the effect of complexity of preparation on preference. The reader can make special groupings of his own, if he desires, in order to test other hypotheses.

The relative status of the various groupings of foods is illustrated in Figure 9.1. Classes are divided into subclasses and some subclasses are further divided into groups. The latter, when used, are shown and subsequently discussed in lieu of the subclass in which they belong. Each group is considered a subclass in computing averages. In this diagram each class and subclass or group is shown in its proper relationship to the vertical scale in the center. The class name is shown in large type centered opposite the position of the class mean on the scale. The vertical line associated with each class name extends from the scale position of the highest rating group or subclass in the class to that of the lowest. The name of each group is shown in smaller type at the position of its mean rating. The horizontal positioning of the various classes was dictated by convenience and has no significance.

The importance of the relationships displayed in Figure 9.1 depends in part on the validity of the groupings. The decision to include certain particularly good or poor foods in a given class could alter both its mean and range. Possible questions concerning this were raised in the previous chapter. Certainly this information will be of most value to one who has a general interest in food habits and food acceptance. Practical decisions, such as whether to serve a food or how often it should be served, should be guided by preference data on the item itself rather than the status of its class.

These points may be noted in this over-view of the results: **Breads** are high in the hierarchy of preference and have a very small range. **Main dishes** are typified by a very broad range, demonstrating the heterogeneity of the large number of foods which were placed in this functional class. Note that **Fish** and **Fowl** occupy the terminal positions. **Vegetables** occupy the lowest position of all classes; **Soups** are next lowest but **Fruits** are at a reasonably high level, and **Desserts** are near the top, as might be anticipated. The broad range between **white potatoes** and the other subclasses in this class demonstrates the unique place of this starch in the American dietary.

Through the years many persons with a wide variety of interests have asked: "What foods are best liked by men in the Army?" "Which are least liked?" Table 9.1 provides the answers to these questions. **Fresh milk** is unquestionably the best liked; it occupies the 100th centile by itself and is 0.20 scale points above **hot rolls,** its nearest competitor for popularity honors. There are a number of classes represented among the "best" foods; they include meats, desserts, breads, one potato, and one beverage item. The picture is quite different for the "worst" foods;

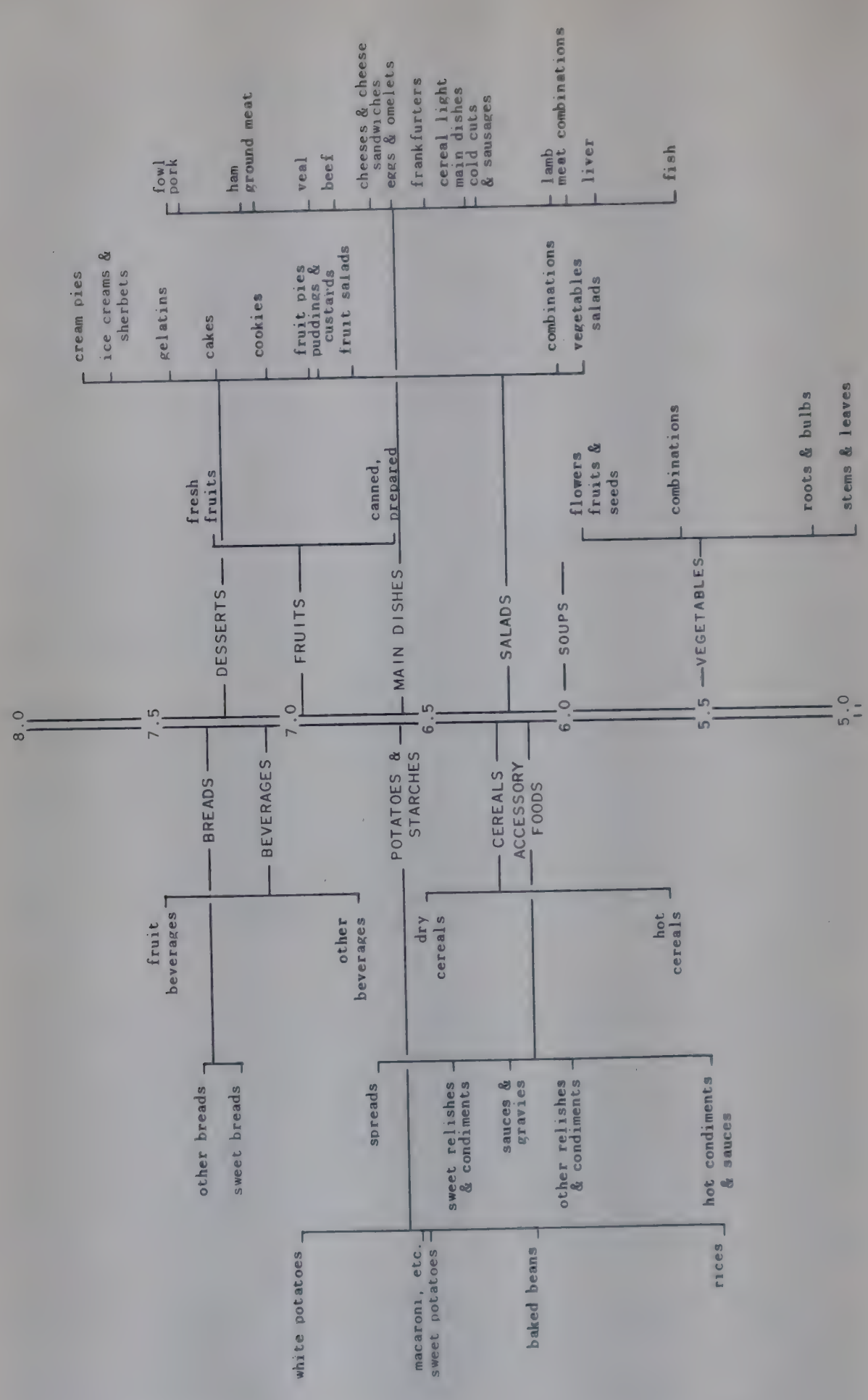

FIGURE 9.1 Preference positions of classes and groups.

these are concentrated in the **Vegetables** class with only one representative from another class, iced coffee.

Table 9.1 Foods best liked and least liked by Army men

Best liked			Least liked		
Food	**Mean rating**	**Centile rank**	**Food**	**Mean rating**	**Centile rank**
Fresh milk	8.60	100	Mashed turnips	4.57	4
Hot rolls	8.40	99	Broccoli	4.56	4
Hot biscuits	8.33	99	Baked hubbard squash	4.52	3
Strawberry shortcake	8.32	99	Fried parsnips	4.47	3
Grilled steak	8.31	99	Creamed asparagus	4.47	3
Ice cream	8.26	98	Cabbage baked with cheese	4.30	2
Ice cream sundae	8.24	98	Asparagus with hollandaise sauce	4.20	2
Fried chicken	8.24	98	Iced coffee	4.15	2
French fried potatoes	8.17	97	Cauliflower with cheese sauce	4.09	1
Roast turkey	8.13	97	Candied parsnips	4.06	1

ACCESSORY FOODS

Results on the 39 items comprising this "miscellaneous" class are presented in Table 8.1. This class represents, in part, a compromise to provide for various small groups that otherwise would each have required a separate class; however, they do have functional similarity in that all, or nearly all, of them fulfill an auxiliary or supportive role in the meal, rather than being a main constituent. This role may vary from adding a dash of flavor (black pepper) to that of gravy or jam which for some people on some occasions may represent a significant part of the meal. With the exception of vegetable garnishes they tend to be highly flavored or spicy. While some of them are occasionally eaten separately -- again we may cite vegetable garnishes -- for the most part they have the function of contributing to other dishes. Hence the question may well arise as to what a stated preference for one of them may mean. For example, if someone says he likes **mustard,** does it mean that he likes the flavor of mustard itself, or that he likes many other items better when mustard is used with them? Perhaps it means some of both.

The mean for the class (6.18) is 0.34 scale points below the mean for **All Foods,** a difference which is probably reliable since it is based on a large number of foods. It is a heterogeneous class, ranging from 7.39 for **brown gravy,** which is in the 81st centile, to 4.69 for **black olives** in the 5th centile. **Hot condiments and sauces** is the lowest rating subclass

at .68 scale points below the class mean. Both kinds of horseradish are very low (6th centile). The **sauces and gravies** subclass has four items above the 50th centile, although its average is about the same as for the class. **Spreads** is the best liked subclass, its average being raised by the high ratings for jams and jellies. The rating for the garnish, **carrot strips** (5.79) is lower than **creamed fresh carrots** (5.92) and **buttered carrots** (6.12), which appear in Table 8.11.

An interesting trend may be noted for the subclass **Condiments and Relishes—other.** Six of the eight items for which background effects were tabulated show preference increasing with age, the most definite of which is the 2.05 scale points for **raw celery. Celery** and **olives** show preference increasing with education, and there are important region effects for five items, with a definite tendency for low preference in the Southeast. **Olives** vary on four background factors and might be characterized, without being too serious about it, as a "sophisticated" food since it is liked better by older, better educated people from the larger population centers.

With four of the **spreads and coconut** (from the first subclass) there is an effect which is characteristic for sweet foods and appears in many different classes. Preference decreases with age, which substantiates the common observation that sweet foods are more acceptable to young people.

BEVERAGES

Beverages (Table 8.2) are one of the highest rating classes, being exceeded only by **Breads** and **Desserts.** All of the fruit beverages are above the 50th centile and only three of the other beverages fall below that point. This class also has the greatest range of variation, 4.45 scale points between the preference champion, **fresh milk,** and **iced coffee,** one of the ten lowest. Other items among the preference leaders are **frozen orange juice, lemonade, and chocolate milk.**

Some interesting relationships emerge from the data on the three kinds of tea. **Iced tea** is definitely better liked than **hot tea,** and when the words **with lemon and sugar** are added to **iced tea,** the rating goes up appreciably. Apparently the additional words succeeded in arousing a clearer, hence more pleasant flavor image for many respondents. Background effects were tabulated for **hot tea** and **iced tea.** Both vary importantly on **education** and **length of service,** although the trend is definitely increasing only for **iced tea.** Both items show important regional variation, and an interesting reversal appears. **Hot tea** is high in the Northeast and low in the South Central areas while for iced tea these areas are reversed. This emphasizes the greater importance of the tall, cold drink in hot climates.

The tendency for preference for sweet foods to decrease with age is again evident. All six of the sweet fruit juices show this effect, as also do **hot cocoa** and **chocolate milk.** The decrease with **length of service,** often associated with **age,** occurs with four of the items. **Fresh milk** also shows decreasing preference with age. Although everybody seems to like it, the younger people like it even better.

Just as with ice tea, adding a qualifier to coffee changes the response. **Coffee** rates 6.61 and **hot coffee** rates 7.42, even though usually

both names apply to the same item. **Iced coffee,** though, apepars to be a distinctly different item. It rates 3.27 scale points lower than **hot coffee** and, while the latter shows an increase in preference with **age, iced coffee** shows no effect with age but a definite decrease with **length of service**. The strong regional effect on **iced coffee** is the opposite of that for iced tea. Evidently what popularity **iced coffee** has as a cool summer drink is in New England where it can compete with **iced tea,** but, in the South, high preference for **iced tea** tends to exclude the less-liked **iced coffee** to an even greater extent.

Similarly, it is apparent that the respondents consider **soluble coffee** as a different entity than simply **coffee** or **hot coffee.** It rates 5.16 -- considerably lower than both. There is evidence that this disparity is due entirely to attitudes, presumably the belief that soluble coffee is a substitute product and therefore inferior. Taste tests conducted by the Field Evaluation Agency over a period of years, using groups of soldiers as subjects, have consistently shown that most soluble coffees are liked as well as or better than the regular Army brewed coffee when the factor of knowledge is eliminated. Yet, in attitude studies, the soldiers continue to express dislike for it. The data in Table 8.2 were obtained in Survey 8 in 1954. A repeat survey in 1958 showed no change in relative preference for the two products.

BREADS

The results on **Breads** (Table 8.3) suggest that the staff of life has retained much of its traditional importance in spite of the greater variety of foods now available. Preference for breads is generally high. The class average of 7.30 is higher than for any other class, even desserts. Every item lies above the 50th centile and seven of the 18 items are above the 80th centile. Practically everybody uses bread, as is evidenced by the low figures in the **percent not tried** column. It may be noted that the plainest kind of bread, **white bread, sliced** gets a rating of 7.65 which places it in the 89th centile in the distribution of all foods. **Hot rolls** and **hot biscuits** are cited in Table 9.1 as the second and third best-liked items in the entire list.

The sweetened breads do not consistently show decreasing preference with **age,** as might be expected on the basis of what happens with other sweet foods. A number of items, both **sweet** and **other** show a decrease with **length of service,** while only **hard rolls** show an increase. The complete absence of important regional effects for the sweet group can be contrasted with the important area effect for **hot cornbread.** The high preference areas for this item are both in the South; furthermore, the decreasing preference with **size of town** points up cornbread as more of a rural tradition. A different picture emerges for **rye bread** which also has important **region of origin** and **size of town** effects. Preference for it is low in a Southern area, high in the Midwestern and Eastern States, and increases with **size of town.**

CEREALS

The **Cereals** class (Table 8.4) rates .27 scale points below the **All Foods** mean of 6.52, but its two subclasses are quite different. The **Cold Cereals,** consisting of six kinds of prepared breakfast food, average 6.53 and its best representative, **corn flakes,** lies in the 79th centile. **Corn flakes** do not even have a close competitor for popularity with the soldiers.

There is a general trend toward decreasing preference with **age;** five of the nine foods show this effect and three of these also decrease with **length of service. Hot cooked cornmeal mush** is an interesting item. Definitely the least liked, it lies in the 8th centile, and it shows important variation on all five background factors. Again, as with **hot cornbread,** the Southern rural effect is suggested; it is liked best in the Southwest and preference decreases with **size of town.**

DESSERTS

Desserts (Table 8.5) are one of the larger classes, containing 71 items in six different subclasses. As would be expected, preference is typically high; the class average rating, as 7.23, is second only to **Breads** and is .71 scale points above the **All Foods** mean. Only ten of the individual items are below the 50th centile, and ten of them are above the 90th centile. The group means are fairly homogeneous, ranging from 6.89 for **Puddings and Custards** to 7.63 for **Ice Creams and Sherbets.** The over-all range for the individual items is large -- from 8.32 for **strawberry shortcake** in the 90th centile, to 5.89 for **apricot cobbler,** which falls in the 25th centile.

Desserts in general are so well liked that the popularity leaders do not stand out. **Strawberry shortcake, ice cream,** and **ice cream sundae** are grouped at the top, followed closely by **strawberry ice cream** and **banana cream pie,** both of which also rate above 8.00.

Among the least-liked desserts one finds **bread pudding,** the traditional economy dessert which has often been the source of mild humor for that reason. Although low in the distribution for its class, it attains the rather respectable rating of 6.42, just .10 scale points lower than the **All Foods** average. It is .32 scale points higher than its economy companion **baked rice pudding,** and also rates higher than a number of items in the **Pies and Cobblers** subclass. Within this subclass a neat dichotomy is possible. **Cream or meringue pies** are consistently high, none of the seven falling below the 77th centile; but the **fruit** items average .71 scale points lower and contain five items which are below the 40th centile. That **mince pie** is one of the latter may occasion some surprise in light of its status as part of America's holiday tradition, but the following points concerning raisins may be applicable.

The other four low-rating fruit pie items are two each containing apricots and raisins. This relates to a general pattern of low preference for apricots and raisins which also shows up in the results for other classes. **Raisins** and **seedless raisins** appear among the **Accessory Foods** (Table 8.1), and they rate just slightly higher than **raisin pie** and **raisin cobbler;** however, they do not stand out there because of the generally low preference for **Accessory Foods. Raisin bread** (Table 8.3) is an exception; it rates high. However, it may be noted that **raisin bran muffins** is the lowest rating item in the **Breads** class. Referring ahead to **Fruits** (Table 8.6), we see that fresh **apricots** rate 6.68 and lie in the 53rd centile. This might be considered as an exception to the general pattern, but this rating is .60 scale points below the average for fresh fruits. **Stewed apricots** are also low, being in the 16th centile. The **Salads** class (Table 8.9) also provides some information. Two salads contain apricots as an ingredient; one is in the 47th centile and the other in the 25th. **Apples and raisin salad** is in the 26th centile and **carrot and raisin salad**

rates 5.04 (8th centile). In the latter, two low-preference foods have been combined, and raisins can hardly be assessed all the blame for its low-preference.

Comparison of the results for **brownies** and **brownies (fudge cookies)** indicates a probable source of error with many foods in the surveys. The same item is intended in both cases, but it is evident that the name, **brownies,** was not an adequate designation. When the more descriptive **fudge cookies** was added the **not tried** responses dropped from 27 percent to 4 percent and the rating went up from 6.99 to 7.48.

Several points with regard to the relation of preference to the background factors are of interest. The age effect already noted with sweet foods in other classes is outstanding here. With only a few exceptions preference for **Desserts** decreases with **age** or **length of service,** and usually it decreases with both factors. Not a single item shows an increase with either factor. **Region** effects are notable because of their almost complete absence, except in the group **Fruit Pies.** Here six of the 13 items show important regional variation. It is further evident that fruit pies are not very popular in New England since this is the low-preference area for all but **pumpkin pie,** and it may be debatable whether the latter should be called fruit pie. **Custard pie** has large regional variation with high-preference in the Southeast and low-preference in New England, the pattern which is typical with many traditional Southern dishes.

Preference for **apricot pie, apricot cobbler,** and **raisin pie** decreases with **size of town,** and South Central is one of the high-preference areas listed for each. This would tend to identify these generally low-preference desserts with the rural South.

FRUITS

Preference for **Fruits** is generally high; the class mean preference ranks fourth among all classes, being exceeded only by **Breads, Desserts,** and **Beverages.** The average for fresh fruits is considerably higher than for canned or prepared fruits. Six of the 11 ratings in the **Fresh** subclass fall at or above the 90th centile, but only three of 14 in the other subclass are in this region. **Fresh peaches** (8.05) are one of the preference leaders among all foods in the surveys, and **watermelon** (7.99) is close behind. It is interesting to note **peaches, canned** (7.92) rate nearly as high as the fresh item. Another processed item, **fruit cocktail** (7.88), also shows high preference. Another point of interest with the latter is the low percentage of **not tried's** (1 percent). **Figs** emerge as one of the poorer items in this class. **Figs** (5.94) and **chilled figs** (5.64) are definitely the least liked of the fresh fruits and **canned chilled figs** (5.60) rate about the same.

Rhubarb (5.30) in the 12th centile, is the lowest rating item in the class, but has a close competitor for this dubious distinction in **stewed prunes** (5.32). Here, again, is one of the traditional economy desserts like **bread pudding** (see **Desserts**). The latter, however, at 6.42 is much better than **stewed prunes.** Adding the word **cold** to **stewed prunes** creates a much more favorable image and raises the rating by .67 scale points. In the **Desserts** section, above, the generally low preference for apricots was cited. Here we should note that fresh **apricots** (6.68) tends to be an exception. It is somewhat below the average for **Fruits,** but

falls in the 53rd centile in the distribution for all foods. **Stewed apricots,** however, rate 5.50 and is in the 16th centile.

The most notable point about the background effects for this class is the high frequency of occurrence of decreasing preference with **length of service.** Eleven of the 18 items which were analyzed show important dcreases with this factor and none shows an increase. The expected correlation with age is also apparent, where seven items decrease and none increases. **Grapefruit** shows increasing preference with both education and **size of town**—again as with **olives** (see **Accessory Foods**) we have a suggestion of a "sophisticated" food. **Apricots** in both the fresh and stewed forms show important regional variation, with the Southwest showing high-preference in both instances.

MAIN DISHES

Main Dishes is by far the largest class. It contains 95 individual items and consists of four subclasses with meat further divided into 12 groups of items. The criterion for placing an item in this class was strictly functional; it was included if it usually is the major component of the meal at which it is served. Consequently meat dishes are predominant, since in the American culture in general and particularly in Service feeding, meat is considered the focus of the meal. There are, of course, exceptions. For example, some of the dishes in the **Baked Beans** and **Macaroni, Noodles** and **Spaghetti** subclasses are occasionally served as the main constituent of the meal; however, they were placed in **Potatoes** and **Starches** because, in feeding in the Armed Services, they are almost always in the auxiliary role.

As would be expected because of its large number of items, **Main Dishes** cover a wide range. The best individual item, **grilled steak** (8.31, 99th centile) rates 3.73 scale points higher than the poorest, **baked fish** (4.58, 4th centile). The subclass averages (Figure 9.1) cover a range of 1.83 scale points, from **Fowl** (7.42) to **Fish** (5.59). The class mean (6.60) lies very close to the **All Foods** mean (6.52). Background effects on preference for these dishes are relatively less important for many of the other classes, although there are strong background effects for certain items and subclasses.

The first three subclasses listed in Table 8.9, consisting of dishes of which the main constituent is eggs, cheese, or cereal, may be termed **light main dishes** since they are typically served at breakfast or for snacks or lunches, in other words, where the amount of food consumed is relatively low. However, in this role they still supplant the more typical meat main dish, hence should be considered in the same functional class.

Eggs and **omelets,** one of the few subclasses typically served at a specific meal, breakfast, have a fairly homogeneous range (1.61) and an average rating (6.62) almost identical with that of all **Main Dishes.** By far the best item is **fried eggs** (7.71, 90th centile); the lowest rating items are **plain omelet,** and **cheese omelet,** but both of these are above the 30th centile. For four of the seven egg dishes for which background data were analyzed preference increases with **age** -- a converse of the relationship generally found for **Main Dishes.** Only one of these dishes shows a regional effect.

Cheese and **Cheese Sandwiches** also have an average rating (6.70) close to that of all main dishes. The two highest ratings are those for the toasted cheese sandwiches; **toasted American cheese sandwich** rates .59 scale points higher than **American cheese** itself. The poorest item in the subclass is **cottage cheese** (6.03); however, it may be atypical of this subclass. Its placement here was one of the arbitrary decisions that had to be made. It could just as well have gone into **Accessory Foods** since it is often served as a garnish or is combined with other foods (see **Combination Salads**). It is the only cheese dish for which preference varies with **region of origin;** and nearly all cottage cheese salads exhibit similar regional variation with preference high in the Southwest and low in New England.

Cereal Light Main Dishes contain only four items, but have a wide range of preference (2.43) from **french toast** which falls in the 76th centile to **fried cornmeal mush,** in the 6th centile. The rating of the latter (4.81) is similar to that of **hot cooked cornmeal mush** (5.04), in the **Hot Cereals** subclass. Preference for **fried cornmeal mush** varies inversely with all background factors, where a trend is possible except **age.** The decrease with **size of town,** and the high-preference in two southern areas and low-preference in New England suggest that it is another dish of the rural South.

The remaining 12 groups embrace the large subclass of main dishes containing meat. As such, they represent the core of the American diet. Before entering into detailed discussion of these dishes, it will be helpful to refer to Table 9.2. It demonstrates a general principle which seems to hold not only throughout the **Main Dish** class but is also evident in other classes as well. This table has been set up to show the effect of simple **vs.** complex preparation on preference for individual dishes in five of the major meat groups. Ratings for individual items have been extracted from Table 8.7 and are shown in relation to the group mean. For each group the dishes are listed in judged order of complexity of preparation, i.e., the first meat cooked in units of serving or larger and with minimal or no seasoning, followed by dishes where the meat is cut into smaller sizes or ground, where gravies and other ingredients, such as vegetables, are added, and where more seasoning is typically used. Although there might be some disagreement with the details of the ordering, the general effect is clearly evident. As one proceeds from the simple to the complex, as here defined, preference falls consistently and with but few inversions. An analogous effect is noted with **Salads** (Table 8.9) and **Vegetables** (Table 8.11), where preference for combination dishes is consistently lower than for the individual items which enter into the combinations.

The **Beef** group has an average preference (6.82) only slightly above that of all main dishes (6.60); however, it has a large range (3.22) and includes many of the best-liked main dishes. **Grilled steak** (8.31) is one of the main dishes included in the list of the ten best-liked foods (Table 9.1) and four other **Beef** dishes lie above the 90th centile. Seven of the 17 items lie below the 50th centile; four of these are different preparations of corned beef and the other three are variations of creamed beef on toast. The results on these dishes show an interesting **name effect** in that adding the word **chipped** to **creamed dried beef on toast** raises the rating by nearly a scale point. A possible explanation is that **chipped**

Table 9.2 Effects of simple vs. complex preparation* on preference for five groups of meat dishes

Group	Group mean	Dish mean	Diff. from group mean
Beef	6.82		
Grilled steak		8.31	1.49
Swiss steak		7.92	1.10
Roast beef		8.02	1.20
Pot roast of beef		7.74	.92
Pot roast of beef with brown gravy		7.90	1.08
Boiled beef with vegetables, carrots, onion, potatoes		6.76	-.06
Creamed fresh beef on toast		6.41	-.41
Beef pot pie with mashed potato topping		7.18	.36
Beef stew		6.73	-.09
Beef stew with noodles		6.76	-.06
Pork	7.41		
Grilled pork chops		7.83	.42
Breaded pork chops		7.46	.05
Roast pork		7.72	.31
Roast pork with fried apple rings		7.12	-.29
Ham	7.14		
Grilled ham		7.60	.46
Baked ham, sugar cured		7.68	.54
Braised ham steak and pineapple slices		7.46	.32
Ham slices with scalloped potatoes		7.37	.23
Ham loaf		7.15	.01
Ham a la king over hot corn bread		6.58	-.56
Diced ham and cabbage		6.15	-.99
Lamb	6.04		
Shoulder lamb chops		6.71	.67
Roast lamb		6.13	.09
Lamb patties		5.55	-.49
Lamb stew		5.79	-.25
Veal	6.92		
Breaded veal cutlet		7.60	.68
Roast veal with dressing		7.34	.42
Veal burger		6.74	-.18
Veal stew		6.02	-.90

*In each group dishes involving plain preparation have been listed first.

tends to encourage the image of the dish made from the typical commercially packaged product, whereas its omission lets the respondent imagine the worst. Note that specifying the beef as **fresh** raises the rating another .33 scale point. The inclusion of these corned beef and creamed beef dishes in the **Beef** group explains the low average preference relative to other groups such as **Ham and Pork.** The most consistent background effect for **Beef** is the decrease in preference with **length of service;** eight of the 14 items for which the data were analyzed show this effect. **Grilled steak** shows the relatively uncommon effect of increasing preference with **education.** Steak is an expensive item in our diet, and this increase may reflect the postulated direct relation between education and socio-economic status. The less expensive creamed dried beef items have the inverse trend of decreasing preference with **education.**

The groups, **Ham** and **Other Pork Products,** are sufficiently alike to be discussed together. Both have high average preference, being surpassed only by **Fowl** among the main dishes. That the **Other Pork Products** group is higher than **Ham** is explained by the principle discussed above, of the superiority of simple preparations, since **Ham** contains more of the complex dishes. Only two of the 13 dishes comprising these two groups lie below the 50th centile in the distribution of all foods and both are complex ham dishes. The best items are all solid meats, simply prepared: **Baked ham, sugar cured, grilled pork chops,** and **roast pork.** Important background preference relationships are relatively infrequent. Two complex ham dishes decrease in preference with **education,** and **ham loaf** decreases also with **age** and **size of town.** Only two, **bacon** and **barbequed spareribs,** show regional variation, both being liked best in the South and least in New England.

Lamb, consisting of only four dishes, is one of the poorer groups. With a mean preference of .56 scale points below the class mean of 6.60 it is about equivalent to **meat combinations,** but better than **Liver** and **Fish.** Only one item, **shoulder lamb chops,** ranks above the mean of all foods. **Lamb stew** is preferred to **lamb patties,** which is an exception to the general rule that ground meats are better than stews. All four lamb dishes show marked decrease in preference with both **age** and **length of service.** In addition both **roast lamb** and **shoulder lamb chops** increase in preference with **size of town** and have important regional variation, being best liked in New England.

Veal, also with only four dishes, rates about the same as **Beef.** This group is perhaps the clearest demonstration of the effect on preference of increasing complexity of preparation (Table 9.2). **Breaded veal cutlet,** the best item, increases in preference with age, while **veal stew,** the poorest, decreases with both **age** and **length of service.**

Liver, atypical in being an organ meat, is not well-liked. Both dishes show a decrease in preference with **length of service,** although **grilled liver with smothered onions** also shows a contradictory increase in preference with **age.**

Meat combinations include all meat dishes in which the meat or meats composing the dish are not identified; in those cases where the kind of meat was specified, the combination was placed in the appropriate group. This group has a low average preference (5.98), which is in ac-

cord with the general principle of inverse relationship between preference and complexity of preparation. The best-liked item, **chili con carne,** falls only in the 51st centile, and the poorest, **baked hash,** lies in the 13th centile. Two items vary with **region** and are better liked in the South. Preference for **chow mein** varies with **size of town** only; the increased preference in larger towns may be due to the fact that urbanites have greater opportunity to become familiar with foreign dishes.

Cold Cuts and Sausages have an average preference (6.32) slightly below that of the average main dish (6.60). The eight items are divided into two groups. The sausages, with the exception of the atypical **beef sausage,** all rate above the class mean, while **beef sausage** and the four cold-cut items rate definitely below it, from .35 to .94 scale points lower. There are only a few background preference relationships. **Bologna** and **salami** show a decrease with **length of service;** one sausage shows an increase with **age,** but another decreases. **Sausage cakes and grilled sausage links (breakfast)** both vary with region and show the "southern" effect previously noted with low-preference in New England and high-preference in the Southeast; however, this case is different in that North Central also shows high-preference.

Frankfurters, which are similar to the last class in being processed meat, have an average preference just slightly higher (6.50). Even though this is a homogeneous group, differing only in preparation, its range (1.26) is almost identical with that of **Cold Cuts and Sausages.** The best item is **frankfurters with barbeque sauce** (7.04, 68th centile) and the poorest is **frankfurters with baked beans** (5.78, 22nd centile). Thus, we have a complex preparation at both ends of the distribution of preference; also one of the simplest preparations, **frankfurters, boiled,** rates next lowest (6.04). This might appear to violate the "complexity" principle; however, it must be recognized that all frankfurters as they come to the kitchen, are already a highly processed food -- ground meat, mixed, and seasoned. Three of the four items on which background data were analyzed decrease in preference with **age;** preference for **steamed frankfurters** also decreases with **length of service** and shows large but unsystematic variation with **size of town.** Only one, **grilled frankfurters,** varies with region, with low-preference in New England, just as with sausages.

Ground Meats, despite their relatively low cost, have an average preference rating (7.13) considerably above the class average; they are equally as well liked as **Ham** and only **Fowl** and **Pork** rate higher. The high standing of this group of foods is definitely an exception to the general rule of positive correlation between simplicity and preference, because all of them involve complex preparation. The best item is **cheeseburger** (7.52, 85th centile) and six others lie at, or above, the 60th centile in the distribution of all foods. The lowest, **stuffed green peppers with brown gravy,** is still in the 44th centile. Five of the eight items decrease in preference with **age** and two of these decrease with **length of service.** Only **spaghetti and meat balls** shows regional variation with high preference in the Southwest. **Stuffed green peppers with brown gravy** varies unsystematically with age, but increases with **length of service** and **size of town.**

Fowl, with an average preference of 7.42, stands with **Pork Products** (6.41) as one of the best-liked groups among **Main Dishes. Fried chicken**

(8.24) and **roast turkey** (8.13) rank 8th and 10th, respectively, in the list of best-liked foods (Table 9.1) and **roast chicken with dressing** (7.99) is not far behind. Only one dish, **chicken stew over steamed rice** (6.22, 35th centile) rates below the average for **Main Dishes.** Background effects are almost completely absent, indicating the great general popularity of these foods. **Chicken a la king on toast** shows a decrease with **length of service,** and **fried chicken** has a regional effect, with two Southern areas showing highest preference. Thus, even though this food is well-liked in all areas, the data still support the tradition of fried chicken as a favorite of the South.

Fish has the lowest average rating (5.59) of any main dish group although it is still considerably higher than two subclasses of **Vegetables** (Figure 9.1). The best item, **tuna fish salad** (6.40, 42nd centile) rates below the average for **Main Dishes** (6.60). The two poorest are **codfish cakes** (4.88, 6th centile) and **baked fish** (4.58, 4th centile). Unlike meat dishes, the combination fish recipes are preferred to the more simply prepared items. This group has a much higher frequency of background preference effects than is found with other **Main Dishes.** Background data were analyzed for 11 of the 13 items. Five decrease in preference with **age** and the same five plus three others decrease with **length of service.** Four decrease with **education.** Regional variation is important with six items, and for five the Southeast is the high-preference area, being joined by New England in the case of **codfish cakes** and **sardines.** It may be noted that New England fisheries are the principal source of both codfish and sardines. In most cases the low-preference areas are in the central part of the country.

POTATOES AND STARCHES

This class is like **Main Dishes** in two respects. The class means are almost identical and lie very close to the **All Foods** mean of 6.52. Further, the four subclasses of **Potatoes and Starches** cover nearly as large a range as do the 15 subclasses of **Main Dishes.**

The subclass **White Potatoes** is clearly the best of the four and, with an average rating of 7.00, ranks fairly high in the preference hierarchy among all foods. This substantiates the general acceptability of this familiar food which appears constantly in the diet of most Americans. Only three of the 16 items in the subclass lie below the 50th centile and one, **french fried potatoes** with a rating of 8.17, ranks 9th among the ten preference leaders (Table 9.1). Only **potatoes boiled in skin** rank very low, being in the 22nd centile.

The class mean for **Macaroni, Noodles** and **Spaghetti,** while definitely lower than that for **White Potatoes,** still lies .04 scale points above the **All Foods** mean. One item in this class, **spaghetti with tomato sauce,** at 7.30 rates considerably higher than the rest. The good acceptability sometimes claimed for beans is called into question by the results on **Baked Beans.** The class mean is .48 scale points below that for the more commonly used **White Potatoes,** and all of the four items lie below the 40th centile. The mean for **Sweet Potatoes,** a subclass which is probably substituted more often than any other for the usual white potato dish in the menu, lies only .01 scale points from the **All Foods** mean. Five of its six representatives are close to the 50th centile. The only poor one is

sweet potatoes boiled in skins (5.80, 23rd centile). Equally low preference is shown for white potatoes prepared by this method.

The low-preference position of **Rices** (5.47) probably reflects the fact that it is not included in the customary menu patterns for most American families. Two of the items show 19 percent and 10 percent **not tried** respectively; however, the minimal one percent **not trieds** for steamed rice indicates that it is well known. **Baked rice and cheese** (4.97) lies in the 7th centile and is very definitely the poorest representative of the class.

The relative absence of background effects for white potatoes is again suggestive of the general popularity of this food. **Hot potato salad** is an exception, since it shows important variation with four background factors. It may be noted that the more common **cold potato salad** is much better liked and also shows no background effects. Preference for four of the six sweet potato items decreases significantly with **length of service,** and it is unusual that none shows a decrease with **age. Baked sweet potatoes** even show an increase. All six sweet potato items show fairly large variation with region, and the results support common belief that sweet potatoes are a Southern food. In each case the Southeast is a high-preference area and the Northeast is a low-preference area

Again, preference for all three **Rices** decreases with **length af service,** but only one decreases with **age.** The data indicate that rice is also a Southern dish. All three items in the subclass show important variation with **region.** Again, as with sweet potatoes, the Northeast is always one of the low-preference areas, but with **Rices** the Southwest is always the high-preference area.

SALADS

This class is relatively low in the hierarchy of preference. Its mean, at 6.20 lies .32 scale points below the mean of all foods; however, there is considerable variation among the three subclasses. **Fruit salads,** at 6.78, are much better liked than the **Vegetable** and **Combination** subclasses at 5.94 and 6.02, respectively.

The best-liked item in the class is **pineapple, apricot and banana salad** (7.42, 82nd centile). This should be noted as an instance where the relatively low-preference item, apricots, has had little or no deleterious effect on preference for the combination. Only two of the 11 **Fruit salads** fall below the 40th centile, while 10 of the 16 items in the **Vegetable** subclass and eight of the 11 in the **Combination** subclass are below this point. The poorest item is **chilled asparagus salad with French dressing** which rates 4.44 (3rd centile). This is consistent with the low ratings for the three preparations of asparagus listed under **Vegetables** (Table 8.11). Other low-rating items are **kidney bean salad** (6th centile), **carrot and raisin salad** (8th centile), and **perfection salad (jellied cabbage, celery, carrots)** (8th centile). The best vegetable salad is the relatively simple preparation, **chopped fresh green vegetables with French dressing.** The effect of verbal description on attitude and preference is again demonstrated by **cole slaw,** which rates 6.76, as compared to **cabbage slaw,** which rates 6.26, even though both names refer to the same dish. When the description is made more specific by adding the most common dressing -- **cole slaw with sour cream** -- the rating drops still further to 5.65.

Combination Salads are relatively low in the preference hierarchy as indicated by the subclass average of 6.02. Gross analysis of the data suggests that combination salads are "invented" to please a relatively small number of persons and have limited value for most consumers. By the criterion of general preference, the combination is usually poorer than would be predicted from the ratings of the ingredients when considered singly. This is demonstrated by the combination of the relatively low-preference **cottage cheese** (6.03), with various other items:

Other Item	Rating	Rating of Combination	Change in Rating
Fresh tomatoes	7.90	6.08	-1.82
Canned peaches	7.92	6.44	-1.48
Canned pears	7.63	6.45	-1.18
Canned pineapple	7.69	6.34	-1.35
Apricots	6.68	5.89	- .79

In each case the combination rates much closer to cottage cheese, the poorer ingredient, than it does to the better one. When combined with the low-preference fruit, apricots, the combination rates even lower than cottage cheese itself. **Carrot and raisin salad** is a similar case. It rates 5.04, whereas the four preparations of carrots (Tables 8.1 and 8.11) range from 5.32 to 6.12, and two kinds of raisins rate 6.17 and 6.27 (Table 8.1).

Preference for **Fruit salads** shows a consistent decrease with **length of service.** Background data were analyzed for nine of the 11 items in the subclass and all nine show this effect. It is interesting that five of these nine fail to show the usual correlation with age. The same effect is apparent with **Combination Salads** where six of 11 items show important decreases with **length of service** but none decrease in preference with **age. Vegetable salads** have a contrasting trend; seven of 16 items increase in preference with **age** and five of them show an increase with **length of service.**

Ten of the 11 **Combination Salads** vary in preference, to an important degree, with **region.** The data suggest a North-South differential. In eight cases the Southwest is the high-preference area and in nine cases the Northeast is the low-preference area.

SOUPS

This class of foods is relatively low on the preference scale; at 5.99 the class mean lies more than half a scale point below the mean of **All Foods.** The range of means for individual items is fairly large - 2.43 scale points. Only four of the 13 soups lie above the 50th centile. The best-liked items are **vegetable soup** (67th centile), **cream of tomato soup** (61st centile), and **beef soup with tomatoes, onions, green peppers and spaghetti** (60th centile). The class contains one very unpopular food -- **onion soup (broth type)** (4.59, 4th centile). Two others, **cream of celery soup** and **mushroom soup** are in the 9th centile.

Soups demonstrate one consistent and somewhat unusual background effect. Of the 12 items for which background effects were analyzed, seven show increasing preference with age and none shows de-

creasing preference. The usual correlation of this effect with **length of service** is not present; four items show important variation with **length of service** but no trend is evident. Preference for six soups varies with region, and in four instances Southwest is high and Great Plains is low. However, with **bean soup,** which varies most with **region of origin** preference is highest in the Great Plains area.

VEGETABLES

Vegetables (Table 8.11) as a class are the least liked of all foods. The class average preference rating of 5.52 is 1.0 scale point below the **All Foods** mean, and its best subclass rates lower than **Soups,** the second lowest class. Figure 9.1 clearly demonstrates this. Two subclasses rank far below any others, and the best sub-class, **flowers, fruits, and seeds,** rates above only **Rices, Hot condiments and sauces, Hot cereals,** and **Fish** although it rates about the same as **Combination Salads, Vegetable Salads,** and three of the poorer **Main Dish** groups. **Vegetables** have a range among individual items of 3.97 scale points—the greatest range of any class, even exceeding that of **Main Dishes** which contain many more items.

Despite the generally low ratings, the class contains two very-well-liked foods. They are **fresh buttered corn on the cob** (8.03, 96th centile) and **fresh sliced tomatoes** (7.90, 94th centile). Besides these two stand-outs, only seven other items lie above the 50th centile, and this is a very limited range considering the wide variety of different kinds of products which are represented. These seven include two other preparations of corn, three preparations of green beans, and one each of lima beans and green peas. Fifty-four items (86 percent) lie below the 50th centile, and 26 (41 percent) lie below the 10th centile. Nine of the latter have already been picked out for special mention, being shown in Table 9.1 among the 10 least-liked foods. **Candied parsnips** (4.06) was the lowest rating food surveyed, barely winning this dubious honor from **cauliflower with cheese sauce** (4.09). Twelve different kinds of vegetables are represented among the 26 items that lie in the lowest decile. This group includes all preparations of cauliflower, squash, asparagus, spinach, parsnips, and turnips, and three of four broccoli dishes. The single preparations of egg-plant, brussels sprouts, and leafy greens are also included.

Method of preparation has a definite effect on preference for vegetables. Those items which are described as **buttered** are consistently better liked than those where the word is omitted or where the vegetable has been cooked with some other ingredient. This tendency is apparent for both high- and low-preference items. For example, three kinds of **buttered green beans** rate from .43 to .78 scale points higher than **green string beans with bacon, buttered green lima beans** rate .53 scale points higher than **lima beans boiled with ham hock,** and the two forms of buttered corn are better liked than **creamed corn** or **stewed corn with bacon and peppers.** Similar effect may be noted at the other end of the preference continuum with turnips, broccoli, and even cauliflower.

Morphological structure was used as the basis for establishing the subclasses of vegetables – with the minor addition of the **Combination** group. The rationale for such classification was the apparent impossibility of devising any more functional, or more intuitively meaningful,

scheme. The tables have been organized and the data discussed on this basis. However, no attempt will be made to argue the validity of the classification scheme. The reader can accept or reject it as he chooses.

Flowers, fruits, and seeds contain 30, or nearly half, of all the items in the class. Seventy percent of its items rate above the average for all vegetables, and its average is nearly a scale point above that for the two poorest subclasses. This preference differential is perhaps the strongest support that can be mustered for the morphological classification. All of the better liked vegetables discussed above -- corn, beans, peas, tomatoes -- fall in this class, but it also contains many of the poorest, such as cauliflower, squash, and broccoli. As is true for all vegetables, the members of this subclass show quite a bit of variation on all five background factors. However, a very interesting exception may be noted in that the high-preference items show no such variation. This is true for **fresh sliced tomatoes, buttered green peas,** and for the three best-liked preparations of both corn and green beans. Five items in the subclass increase in preference with **age** and none decreases, a trend which is consistent for the whole class. Broccoli and two preparations of cauliflower all show increasing preference with **age** but decreasing preference with **length of service,** an interesting and unusual effect considering that these two factors are usually positively correlated. Five other items show decreased preference with **length of service,** but only one, **french fried eggplant,** shows an increase. As is true for all **Vegetables,** this subclass shows a relatively high frequency of important variation with region and the high-preference areas are usually in the South. There are four exceptions to this trend: **buttered cauliflower, baked Hubbard squash, mashed squash,** and **fresh grilled tomatoes.** High-preference areas for these items are in the North. **Blackeyed peas,** a traditional dish of the rural South, is so portrayed, by decreasing preference with **size of town** and a very large regional variation (2.40 scale points) with high-preference in the South Central area and low-preference in New England. Four other traditionally Southern dishes -- **green string beans with bacon, lima beans boiled with ham hocks,** and the two preparations of hominy — show high-preference in Southern areas and low-preference in New England.

The **Leaves and Stems** subclass has the lowest average preference for any group. Twelve of its 14 items lie below the **Vegetable** mean. Background data were tabulated for 12 members of this subclass. Increasing preference with **age** is indicated even more clearly than with the previous subclass; eight items increase and none decreases. Again, five of these eight items have the contradictory effect of a simultaneous decrease in preference with **length of service.** The three preparations of asparagus present an interesting and consistent picture. All rate very low, show increasing preference with **age,** but decreasing preference with **length of service,** increasing preference with **size of town,** important variation but no trend with **education,** and important regional variation with low-preference in the Southeast and South Central areas while the Southwest and New England share the high-preference honors. **Turnip greens and bacon,** like **blackeyed peas,** proves its status as a dish of the rural South with decreasing preference with size of town, high-preference in the Southeast and low-preference in New England.

The average rating for the next subclass, **Roots and Bulbs,** is almost as low as for **Leaves and Stems.** It contains the lowest rating item in

the surveys, **candied parsnips,** and 10 of its 13 items lie below the class mean. **Buttered carrots** is the best item in the subclass, although it only reaches the 32nd centile in the distribution of all foods. Background data were analyzed for 11 of the items; however, fewer important background effects were found here than with the first two subclasses. The only contradiction in the class to the trend toward increase in preference with **age** occurs here -- **creamed fresh carrots** shows a decrease. Both preparations of onions show typical increase in preference with **age** and decrease with **length of service.** Three dishes, **creamed fresh carrots, hot spiced beets,** and **scalloped onions** go against the general trend by having high-preference in New England and low-preference in a Southern area.

The fourth subclass, **Vegetable Combinations,** rates close to the class mean. Inasmuch as these six dishes are combinations, low preference might be expected just as was found for combination meat dishes, the relative preference status being due to the inclusion of high-preference components. For example, many of the dishes include corn. The ratings of five combinations -- excluding **succotash,** where the ingredients are not specific -- were compared with the ratings for the individual components. Where there were multiple ratings for a food, the preparation was selected which was judged most similar to the way that food would appear in the combination. In nine of 11 cases, the component item rated higher than the combination. Furthermore, preference for the combination was always at least half a scale point lower than preference for the best-liked ingredient and, in three cases, it was lower than for any of the ingredients. Thus it is apparent that the creation of combinations is not an effective way of improving the acceptance of vegetables.

The three ratings for succotash show the importance of the food name, and also suggest that people tend to react negatively to the unfamiliar. The rating for **succotash** is 5.51, and 27 percent of the respondents indicated **not tried.** However, when the dish was more adequately described and the ingredients specified, the rating increased .41 in one case and .78 in the other and the **not tried** responses dropped to seven percent and eight percent, respectively.

This subclass exhibits less background preference variation than other vegetables, except on **region** where all four items for which background data were analyzed varied. Three items show the typical trend toward high-preference in the South. **Creamed peas and carrots** have an inverse trend with high-preference in the North Central area and low-preference in two Southern areas.

Chapter 10

RELATION OF FOOD PREFERENCES TO CHARACTERISTICS OF THE RESPONDENTS

In the preceding chapter attention was centered primarily on the foods themselves, although background effects and their relation to preference were frequently mentioned. However, the present chapter is oriented toward background factors *per se*. Inevitably there will be some repetition, since we are using the same data, but here we will adopt a different point of view. Much of the difference lies in reorganization of the data. Instead of considering foods class by class, we will take the background factors in succession, summarizing results over the various food groupings in order to bring out general relationships.

Preference-background relationships that were considered important because of the size of the range between the high and low category means were presented in Tables 8.1-8.11 for individual foods, but were not shown for classes and subclasses. All of this information has been summarized in Table 10.1. To construct this table the mean ratings were averaged for each category of each background factor for all items in the group, all items being given equal weight. Such summaries were made for food subclasses (for groups also where they occurred), for food classes, and for all foods. The means for the particular categories have been omitted because the increased complexity of the presentation would hardly be justified by the small increase in information.

Column 2 gives the total number of foods in the particular group for which background effects were analyzed. Note that these figures are successively summarized, i.e., groups, where they occur, are added to give the subclass total, and subclasses are added to give the class total.

Three columns each are provided for **age, length of service, education,** and **size of town.** The first column gives the trend, coded as for the Chapter 8 tables: U = increasing preference with increase in the background factor, D = decreasing preference with increase in the factor, N = important variation but no monotonic trend was apparent. A blank in the trend column means that the range did not meet the criterion of importance. For **region of origin** the same procedure was followed as before of listing the high and low area, or areas, in those instances where important variation was found. Again, as in the other tables, the *Northwest* and *Rocky Mountain* areas were excluded.

The next column gives the range between the means of the highest and lowest categories of that factor, when averaged across the foods in the group. For food classes, all ranges are shown whether or not they met the new criteria of importance presented below.

The third column, labeled "Percent varying", gives the percentage of individual items in the particular group which varied sufficiently to meet the criteria and were so indicated in the class tables in Chapter 8.

For the ranges shown in Table 10.1, adjustments were made in the criteria of importance. The category means based on the averages of a number of items will be more reliable than those for individual foods since they are based on a larger number of responses. Therefore a smaller range should be considered important. The increased reliability would, of course, depend upon how many foods were combined; however, mak-

ing precise adjustments according to the number of foods involved was considered unwarranted. The decision whether or not to indicate a background effect as important was based on a weighing of the factors of magnitude of the range, presence or absence of a definite trend, and the number of foods included in the average. The following guides were used for sub-classes: (a) a range of .30 scale points was included if five or more foods were included and the categories showed a trend; (b) no range above .60 scale points was excluded even if a trend was not present (this then applies to region); (c) for groups of fewer than five items no range below .40 scale points was included; (d) all class ranges are shown and .30 was used as a criterion for all of these background effects.

Prior to discussing the background effects, some statements are in order to remind the reader of certain qualifications of the results which were discussed in Chapter 7. Any person's "background" will consist of combinations of a great many factors, some definable and measurable in the manner considered in this report, and some not. Furthermore, these surveys elected to take information on only a few characteristics, generally selecting those which were easiest to measure. It is possible that some of the most important factors were not included.

Relationship among factors. The factors which were measured are known to be confounded to some extent. Therefore, to attribute an effect on preference to a single background factor may be unwarranted. It might be due to a combination of the measured factors or to a combination of a measured factor with some unmeasured characteristic.

One would expect **age** to be confounded with **length of service** because the majority of new recruits are young men who have just reached draft age. This effect definitely appeared (see Chapter 7). There is some indication that **size of town** is related to **region of origin** since large cities tend to be situated in certain areas but not in others. It is possible that **education** is related to both **age** and **length of service,** although the type of relation might not be easy to predict since there are contradictory trends. For example, older men tend to have more education except, perhaps, in the Services. The practice of granting draft deferments for educational purposes would tend to produce a positive relation between age and education among men with less service; however, the tendency for men with more education to leave the Army after their original period of service would work toward a negative correlation among men with longer service.

Cross tabulations of the background factors within certain surveys (see Chapter 7) either demonstrated, or were suggestive of, the various relationships referred to above. These analyses, however, were concerned with the background factors, as such. The further question is in order of whether, or to what extent, these relationships are reflected in our analysis of background-preference relationships. This was investigated by means of cross tabulation of important background effects (as taken from Tables 8.1-8.11) for certain pairs of background factors.

Table 10.2 presents the joint distribution for **age** by **length of service** over the 377 foods for which background data were analyzed. The positive relation between these two factors is reflected in the fact that 69 foods decrease with both **age** and **length of service.** This is 71 percent of all foods that decrease with **age** and 47 percent of those that decrease with **length of service;** however, 34 of these fall in one class — **Desserts.**

Preference for five foods increases on both factors. Only ten foods show opposing trends, all decreasing with **length of service** and increasing with **age.** Nine of these are in the **Vegetables** class. There are 68 foods which vary with **length of service** but not with **age,** and ten more which have directional variation with **length of service** but a "no trend" effect with **age.** The comparable figures for **age** are 59 and 6. These figures demonstrate that the confounding is far from complete; therefore, one may assume that continued experience in the Army has important effects on food preferences that are independent of age.

Table 10.3 presents the joint distribution for **age vs. education,** and Table 10.4 that for **length of service vs. education.** The significance of these figures is limited because of the relatively small number of foods (69) that show important variation in preference with **education;** nonetheless, it is apparent that neither pair of factors could be very closely related, either positively or negatively. In both cases only a small number of foods show directional trends on both factors and, again, in each case the number of opposing trends is about equal to the number that are in the same direction. Thus, it is apparent that any correlation between **age** and **education** or between **length of service** and **education** is not reflected in our results.

Since the categories for **region of origin** are not on a continuum, the relation between this factor and **size of town** was not subject to the same kind of analysis. Instead, the high-preference and low-preference areas were tabulated according to the direction of the trend on **size of town** for the 58 foods which vary on the latter factor. There are 28 foods which decrease in preference with **size of town,** and also show important variation with region. Of these **New England** is a high area on three and a low on 17; **East Central** is high on none and low on seven. Conversely, **Southeast** is high on 13 and low on one; and **South Central** is high on eight and low one one. The other areas show about the same number of highs and lows. Three of these areas show opposite trends when we consider the 14 foods which increase in preference with **size of town** and show important variation with **region of origin. New England** is a high-preference area on six and low on none. **Southeast** is high on one and low on five, and **South Central** is high on none and low on seven. While these data are no more than suggestive, they do agree with what would be expected on the basis of the known confounding of **size of town** and **region of origin.**

Age-Preference Effects. Age was determined in all survey questionaires by the same six response categories: **under 20, 21-24, 25-29, 30-34, 35-39, 40 and over** (Figure 2.6 and 2.7). Mean ratings in the **40 and over** category were considered unstable because it usually contained only a small number of respondents. Therefore, for purposes of this analysis, it was included in determining the range only when it bore a consistent relation to the other categories.

Mean preferences over all 377 foods for which background data were analyzed did not vary greatly or show a consistent trend with age. The range of the category means is only .13 scale points (Table 10.1). This finding rejects one plausible hypothesis; namely, that younger people, because of better health, greater need for calories, and greater sensitivity to flavors, will show a higher appreciation of foods in general.

However, when we consider individual foods, we find a fairly high frequency of important preference-age relationships—158 foods or 42 percent. **Lenth of service** is the only factor having a higher proportion of important relationships (45 percent). More than half of the 158 foods show a decreasing trend with age. Increases account for about one-third, while large variation without any trend accounts for only 8 percent (Table 10.2). The absence of preference-age relationships for the means over all foods, despite the large number of single items with important variation, indicates that these trends cancel each other. One must assume that the effect of the greater number of important decreasing trends is nullified not only by the foods which show important increases, but also by many items for which preference increases with age although the ranges do not meet the criteria for inclusion in the tables.

What are these foods where preference is affected by age? Which ones are liked more and which are liked less as people grow older? Does preference follow the grouping of foods into competitive classes in some logical way? Some of these questions have been touched on in Chapter 9 where background-preference effects for certain classes or items were mentioned when appropriate. However, here a general summary of the information will be presented.

Six of the 11 food classes show important variation with **age,** which indicates that the individual foods within a class tend to vary in the same way. Preference for two classes, **Soups** and **Vegetables,** increases with **age,** while preference decreases for the other four, **Beverages, Cereals, Desserts,** and **Fruits.** Apparently age has the greatest or most consistent effect (large effects which are not consistent in direction among individual items may cancel each other out in determining the means) on **Soups,** where the range of category means is .80 scale points. The next largest range is .68 scale points for **Cereals.** Another way of evaluating the extent of age effects is to look at the proportion of individual foods which vary. By this criterion the greatest age effects are found in **Beverages** and **Desserts** where 71 percent and 70 percent, respectively, of the items show important variation. Reference to Table 8.5 shows that 40 items among **Desserts** decrease in preference and none increases; among **Beverages** (Table 8.2), nine decrease and only one increases; **Soups** (Table 8.10) show seven increasing with age and none decreasing. Even though the range of category means for **Accessory Foods** falls short of the .30 scale-point criterion of importance, 47 percent of the items in this class vary with age, but there are contradictory trends in different subclasses.

Considering the further breakdown of classes into smaller groupings, it may be noted that, within the six classes cited above, most subclasses agree with the main trend and no sub-class shows a contradictory trend. Both sub-classes of **Beverages** and of **Cereals** show the same decreasing trend as the parent classes, and this is also true of all sub-groupings of **Desserts** with the exception of **Fruit Pies and Cobblers.** However, only one of the two sub-classes of **Fruits** decreases. **Soups** has no sub-classes; two of the four **Vegetables** sub-classes increase. In addition, quite a number of instances of important variation are found within classes which do not themselves vary. Included are seven groups which show important variation with no trend. Four sub-classes show increasing preference -- **Hot Condiments and Sauces, Condiments and Relishes-**

Other, Eggs and Omelets, and **Vegetable Salads.** Seven decrease with age: **Condiments and Relishes-Sweet, Spreads, Sweet Breads,** and **Lamb, Frankfurters, Ground Meats** and **Fish** within **Main Dishes. Lamb** exhibits an exceptionally strong trend - all four dishes vary and the range of category means for the group is 2.39 scale points.

If a summary statement were made about age-preference effects it would have to be, "Young people like sweet foods better." That this is generally true is amply demonstrated. There are three exceptions where "sweet" groups do not show decreasing preference with age--Fruit pies, Fresh fruits, and sweet potatoes. Certain other age effects might come under the heading of common knowledge, e.g., that young people like frankfurters and ground meats better, that older people like "hot" condiments better, and, perhaps, that preference is higher among older people for soups and vegetables. However, it is unlikely that uncontrolled observation would have predicted such effects as the decreases for lamb and fish, although, these decreases may be due to Service experience rather than age, as such, since most of the dishes in these groups also decrease with length of service.

Education-Preference Effects. Educational status was determined in Surveys 1 and 2 with a question (Figure 2.6) containing seven response categories:

(1) Did not complete eighth grade
(2) Completed eighth grade
(3) Completed first year high school
(4) Completed second year high school
(5) Completed third year high school
(6) Completed fourth year high school
(7) Attended college (whether completed or not)

Starting with Survey 3, the additional category, **Attended business or trade school** was inserted between (6) and (7) of the above list (Figure 2.7).

The effect of **education** on preference is considerably less than for **age, length of service** and **region of origin.** Sixty-nine, or 18 percent, of the 377 foods were found to vary to an important degree with this factor; only **size of town,** with 15 percent, shows less variation. Of the 69 items which vary, 29 show a decreasing trend with increase in **education,** 18 increase in preference, and 22 foods meet the range criterion of .30 points but with no detectable systematic pattern (Table 10.4). The range between category means over all foods is .30 scale points—greater than for any other factor except **length of service.** However, .23 scale points of this range are accounted for by the difference between **Attended business or trade school,** with the highest preference, and **Did not complete eighth grade** with the next highest preference. Thus, there is no systematic trend, either increasing or decreasing. Also, it suggests that, food-preference-wise, business school attendees are somehow different. In establishing the successive categories for **education, Attended business or trade school** was placed in order between **Completed fourth year high school** and **Attended college.** However, not only with regard to the **All Foods** distribution but in several other instances as well, the mean of this category is found to differ markedly from the neighboring categories. This suggests that attendance at business school is, in part, determined by

some selective factor which is related to food preference, and that, so far as food preferences are concerned, it means something else than, or in addition to, the completion of several more years of education.

Only two of the food classes show variation which meets the criterion of importance. **Cereals** has a range of .63 scale points among educational categories, but the markedly high-preference on the part of those having less than eight years of schooling accounts for .41 scale points. The adjacent category, **Completed one year high school,** shows the next highest preference. However, the rest of the distribution was such that no trend could be established. **Cereals** is an unusual class. Only one item, **hot cooked cornmeal mush,** varies with education to an important degree; however, the trends were so consistent among items that very important differences were found among category means for the class. The **Cold Cereals** sub-class exhibits important variation in the same pattern as for the class.

The other class with important variation is **Vegetables,** with a range of .35 scale points. Again, the category **did not complete eighth grade** has the highest preference, but this time by only .12 scale points; differences between other adjacent categories were small and no monotonic trend was identifiable. Twenty-five (46 percent) of the 54 vegetable dishes for which background data were analyzed show important variation. Preference for ten vegetable dishes decreases with **education;** in only one case does it increase; and 14 foods display marked intercategory variation but with no definite trends. **Vegetable Combinations,** the only **Vegetables** sub-class showing a definite trend, decreases markedly with **education.**

Among the remainder of the foods there are relatively few instances of important preference variation. Four other sub-classes decrease in preference with education. These are **Hot Condiments and Sauces,** and four meat groups: **Veal, Meat Combinations, Frankfurters,** and **Fish.** Only one, **Canned or Prepared Fruits,** increases. Only one group shows important variation but no definite trend—**Cold Cuts and Sausages.** Half of the .62 scale points variation in this group is accounted for by an extremely low preference mean for the **Attended trade or business school** category. Among **Condiments and Relishes—Other,** although the sub-class itself does not show important variation, four of eight items vary, three increasing and one showing no trend. The classes, **Breads, Desserts, Fruits, Potatoes and Starches,** and **Salads,** all have very low percentages of items which vary with **education.**

Length of Service - Preference Effects.....Length of service was determined in Surveys 3 through 5 (Figure 2.7) by responses to the following categories:

(1) Less than two months
(2) Two, but less than six months
(3) Six, but less than 18 months
(4) 18, but less than 36 months
(5) Three years or more

In Surveys 1 and 2 the first category was **Less than six months,** so that only four categories were used (Figure 2.6).

Length of service was found to affect food preferences more than

any of the other factors. Table 10.1 shows that 45 percent (168) of the 377 foods vary with length of service. The frequency of the different types of trends among individual foods indicates a strong decreasing trend. Of the 168 items which show important variation, 88 percent decrease, only 7 percent increase, and 5 percent show no trend. Also, **length of service** is the only factor for which there is a definite effect on mean preference over all foods, with a range of .38 scale points and *D* trend. The category means are:

Less than 2 mo.	2-6 mo.	6-18 mos.	18-36 mos.	Three years or more
6.78	6.65	6.50	6.40	6.46

Considering now the sub-groupings of foods, as would be expected, we continue to find strong expression of the decreasing preference *motif*. Eight of the 11 classes show important variation. **Beverages, Cereals, Desserts, Fruits, Main Dishes,** and **Salads** decrease, and **Soups** and **Vegetables** varied but show no trends. The highest range of differences between category means for any class is .61 scale points for **Desserts.**

Twenty-nine of the 47 sub-groups (including all groups and those sub-classes containing no groups) listed in Table 10.1 show important variation with **length of service.** Only one, **Hot Condiments and Sauces,** increases in preference, 25 decrease, and three show no trend. The highest range of difference between category means was 1.63 scale points for **Lamb.**

The highest proportion of individual items affected by length of service occurs in **Desserts**—70 percent. All 43 trends in this class are decreasing. **Main Dishes** has about the same number of trends as **Desserts,** although, of course, a smaller proportion because of the larger number of cases. Thirty-seven **Main Dishes** decrease in preference with **length of service,** only two increase, and one varies but has no trend. The **Desserts** class contributes the strongest demonstration of the close association between **length of service** and **age** in that 34 foods decrease with both factors. Among **Main Dishes** there are 14 instances of such simultaneous decrease; however, this class exhibits independence between the two factors to a greater extent. Twenty-three of the **Main Dishes** which decrease in preference with **length of service,** either show a different trend or fail to vary on **age.**

The only instance of a consistent increase in preference with length of service, besides **Hot Condiments and Sauces,** occurs among **Salads.** Five items in the **Vegetable Salads** sub-class increase and none decreases. This is in contrast with the other two types of salads, both of which consistently decrease in preference with length of service.

Any summary statement regarding the relation between food preference and length of time in the Army must recognize, first and foremost, that it is a very important factor and that its major effect is toward lower preferences, so that one should expect the acceptability of the standard ration to be lower among more seasoned troops. Perhaps this statement should be qualified by limiting it to the Army as constituted during the period of these surveys. With an Army made up primarily of older professional soldiers this relation might not hold. Finally, the positive correlation between age and time in the Army must again be noted, along with the admission that we do not know how much of the length-of-service effect is actually due to age.

Size of Town-Preference Effects. Size of town was determined by responses to the following categories:

(In Surveys 1 and 2)	(In Surveys 3, 4, and 5)
(1) On a farm	(1) On a farm
(2) In a small town	(2) In the country but not on a farm
(3) In a city (over 30,000 people)	(3) In a village with fewer 2500 people
(4) In a very large city (New York, Chicago, Philadelphia, Los Angeles, Detroit)	(4) In a small city with between 2500 and 25,000 people
	(5) In a city with between 25,000 and 100,000 people
	(6) In a large city with between 100,000 and one million

This factor has the least effect on preference of the five which were measured in the surveys. The variation between category means averaged over all foods is negligible. Excluding **country, non-farm,** the range is .07 scale points; if that category is included, the range increases to .18 scale points. Fifteen percent, or 58, of the individual foods were found to vary to an important degree. Of these, 31 decrease in preference as size of town increases, 17 increase, and 10 vary but show no trend.

Only three classes show important variation among the category means for **size of town.** The one class which shows an increase is **Beverages,** with a range (.33) just above the minimum criterion. This is particularly interesting since no individual beverage shows an important effect. No class decreases in preference with **size of town.** For **Main Dishes** and **Vegetables** there is appreciable variation between category means, with no trend evident; however, in both cases at least half of the variation is due to an unusually high mean for the category, **country, non-farm.** Thirty-seven percent (20) of the individual items in the **Vegetables** class varied on **size of town;** of the 20 foods, eight decreased, seven increased, and five varied but with no trend. Only 10 items in **Main Dishes** show variation with **size of town** and no other class has more than five.

Considering sub-classes, we find that only three show important variation. **Sweet Condiments and Relishes** decreases in preference with increasing **size of town,** while **Beverages—Other** (other than fruit beverages) increases. **Lamb** shows a large "no-trend" effect arising from very high-preference on the part of the respondents from large cities and low-preference on the part of residents of villages; the range among other categories was one-quarter of the total range. In addition, there are a few size of town-preference effects within groups which do not themselves display important variation. Four items in **Pies and Cobblers** decrease and seven **size of town** effects about equally divided among *D, U,* and *N* appear within the meat groups other than **Lamb,** which has already been cited as displaying an important increasing trend. Within the **Vegetables** sub-class, **Leaves and Stems,** five dishes, three of them containing asparagus, show important increases, but their effect on the sub-class means is cancelled out by two others which decrease.

Region of Origin-Preference Effects. **Region of origin** was determined by asking the respondent to indicate the area in which he had lived most of the time until he was 16 years old. Ten regions were established within the continental United States as indicated in Figures 2.7 and 7.1. They are named in the code key in Table 10.1. The response categories in the questionnaire listed the states included in each region. A category was provided for those who were reared outside the United States; however, there were so few such cases that the responses were not tabulated. Two regions within the United States, **Northwest** and **Rocky Mountains,** were tabulated but were not considered in the analysis of background effects because the number of respondents from these areas was so small that the means would have been unstable. This, of course, leaves a hiatus in the results, and no estimate can be made of how seriously it might affect the patterns of high- and low-preference areas.

The frequency of regional effects on preference is of about the same order as for age and length of service, although somewhat less than either. Thirty-eight percent, or 143, of the 377 foods for which background data were analyzed show important variation with this factor. Mean preference over all foods varied little among the areas; the range of .20 scale points does not meet the minimum criterion of importance. However, a different type of analysis reveals some interesting general trends. A tabulation was made of the frequency with which each of the eight regions appears as a high- or low-preference area for the 143 foods showing important variation. Results are given in Table 10.5. The **Midwest, North Central, Great Plains,** and **South Central** regions appear as high or low areas with about equal frequency; however, the frequencies for the other four are disproportionate. **New England** and **East Central** both appear as low areas twice as often as high areas. On the other hand, **Southeast** is listed as high twice as often as low, and **Southwest** is high five times as often as low. **New England** is particularly interesting; not only is it low on about three times as many foods as any other area, but it also records a fairly large number of highs. Even though no regional effects appear when preference is averaged across all foods, these data indicate that high- and low-preference foods do not necessarily cancel out within region. Apparently there are many more dishes which are typically southern, and therefore preferred in those areas, than there are dishes which are specialties of other areas.

Moving down to food classes, we find many differences. Only four classes — **Breads, Desserts, Fruits** and **Main Dishes** — fail to show important differences in preference means among the area categories. The disproportion among areas in frequency of "highs" and "lows" carries over to the class averages to some extent. **Southwest** is a high-preference area on **Cereals, Potatoes and Starches, Salads** and **Soups; Southeast** is a high area on **Potatoes and Starches** and **Vegetables.** Neither area is low for any class. **New England** is a low area on **Accessory Foods, Potatoes and Starches,** and **Salads,** but is a high area on **Beverages.**

The class, **Vegetables,** has the highest proportion of variation with 74 percent. Each of its four sub-classes has a fairly high proportion of individual foods which vary; however, only in the case of **Vegetable Combinations** does the range meet the criterion for important variation between sub-class means.

The two largest ranges between category means for sub-classes are for **Rices** and **Sweet potatoes.** In both cases a southern area is high and **New England** is low. The general popularity of one of the staples of the American diet, white potatoes, is reflected by the almost complete lack of variation among the category means averaged over the 14 items in this sub-class. The class, **Main Dishes,** does not show important variation, and only 6 of the 15 groups (considering each type of meat separately) do so. The southeast or southwest areas appear as high-preference areas for 4 of these 6 groups.

Meaning of the Relationships. Of the five background factors, three show high percentages of foods varying in preference. Of the three, **length of service** is associated with a downward trend for most foods, regardless of class; but, for **age** and **region of origin,** preference varies differently for different classes. Furthermore, age, especially, and region of origin can be looked on as more personal characteristics of the individual than a few years of military service. This fact, therefore, leads to speculation or hypothesis formation concerning the cause-and-effect relationships between food preferences and either age or region of origin.

If the differences that are associated with region of origin are culturally determined, one can hypothesize that, with increased communication, travel, and national distribution of products, the differences will become smaller with time. However, if the differences are related to the physical environment, such as climate, then at least some differences can be expected to persist. Similarly, if the differences in preference associated with age are in reality related to the historical period in which the individual grew up, the patterns can be expected to be different in surveys conducted some decades hence. The preferences would be related not to age but to date of birth. However, if the relationship between age and food preference remains constant in future surveys, one may look for a physiological basis for the change in preference with age.

The two factors of age and region of origin, then, not only currently relate more strongly to differences in preferences than the other factors studied—they offer more promise for future investigation of the correlates of food preferences.

TABLE 10.1 RELATION OF PREFERENCE TO BACKGROUND FACTORS SUMMARIZED BY FOOD CLASSES, SUB-CLASSES, AND GROUPS.

CLASS, SUB-CLASS AND GROUP	NUMBER OF FOODS	AGE			EDUCATION			LENGTH OF SERVICE			SIZE OF TOWN			REGION OF ORIGIN			
		TREND	RANGE	PERCENT VARYING	TREND	RANGE	PERCENT VARYING	TREND	RANGE	PERCENT VARYING	TREND	RANGE	PERCENT VARYING	HIGH	RANGE	LOW	PERCENT VARYING
ALL FOODS	377		.13	42	N	.30	18	D	.38	45		.18	15		.20		38
I. ACCESSORY FOODS	32		.28	47		.19	31		.11	19		.18	16	GP NC	.30	NE	38
A. CONDIMENTS AND RELISHES-SWEET	5	D	.59	20			20			40	D	.45	40				20
B. CONDIMENTS AND RELISHES-OTHER	8	U	.82	75			50			0			12	NC	.75	SE GP	62
C. HOT CONDIMENTS AND SAUCES	3	U	.66	67	D	.41	33	U	.72	33			0				67
D. SAUCES AND GRAVIES	11			18			36			0			18				36
E. SPREADS	5	D	.97	80			0	D	.80	60			0				0
II. BEVERAGES	14	D	.52	71		.28	21	D	.34	50	U	.33	0	NE EC	.36	NC SC	36
A. FRUIT	7	D	.85	86			14	D	.54	43			0				14
B. OTHERS	7	D	.41	57			29			57	U	.49	0				57
III. BREADS	14		.26	21		.19	7		.28	43		.17	21		.28		28
A. SWEET (WITH SUGAR INGREDIENTS)	6	D	.37	33			17	D	.43	50			17				0
B. OTHER BREADS	8			12			0			38			25				50
IV. CEREALS	9	D	.68	56	N	.63	11	D	.54	33		.13	11	SW	.39	GP	22
A. COLD	6	D	.72	50	N	.68	0	D	.50	33			0				17
B. HOT	3	D	.64	67			33	D	.64	33			33	SW	.76	GP	33
V. DESSERTS	61	D	.63	70		.14	6	D	.61	70		.13	8		.15		13
A. CAKES	19	D	.74	79			11	D	.62	79			5				0
B. COOKIES	8	D	.60	50			0	D	.51	38			0				0

TABLE 10.1 RELATION OF PREFERENCE TO BACKGROUND FACTORS SUMMARIZED BY FOOD CLASSES, SUB-CLASSES, AND GROUPS (CONT'D)

CLASS, SUB-CLASS AND GROUP	NUMBER OF FOODS	AGE			EDUCATION			LENGTH OF SERVICE			SIZE OF TOWN			REGION OF ORIGIN			
		TREND	RANGE	PERCENT VARYING	TREND	RANGE	PERCENT VARYING	TREND	RANGE	PERCENT VARYING	TREND	RANGE	PERCENT VARYING	HIGH	RANGE	LOW	PERCENT VARYING
C. PIES AND COBBLERS	19	D	.49	63			11	D	.59	68			21				37
1. FRUIT	13			46			15	D	.61	69			23				46
2. CREAM OR MERINGUE	6	D	.64	100			0	D	.54	67			17				17
D. ICE CREAMS AND SHERBETS	3	D	1.00	33			0	D	.68	100			0				0
E. GELATINS	4	D	.99	100			0	D	.72	75			0				0
F. PUDDINGS AND CUSTARDS	8	D	.75	88			0	D	.68	75			0				12
VI. FRUITS	21	D	.36	33		.28	10	D	.47	52		.16	14		.28		19
A. FRESH	11			36			18			36			18				9
B. CANNED OR PREPARED	10	D	.53	30	U	.36	0	D	.59	70			10				30
VII. MAIN DISHES	95		.20	34		.16	16	D	.37	42	N	.41	11		.21		27
A. EGGS AND OMELETS	7	U	.60	71			14			14			0	SE SW	.60	NC	14
B. CHEESES AND CHEESE SANDWICHES	5			0			0			40			0				20
C. CEREAL LIGHT MAIN DISHES	4			25			50	D	.87	75			25				50
D. MEATS	71			57			22	D	.39	68			24				28
1. BEEF	14			7			29	D	.87	57			0				29
2. HAMS	7			29			29			14			14				0
3. OTHER PORK PRODUCTS	6			0			0	D	.46	17			0				33
4. LAMB	4	D	2.39	100			0	D	1.63	100	N	.95	50	NE	1.06	SC	50
5. VEAL	4			50	D	.70	25	N	1.10	25			0	SW	.66	MW	0
6. LIVER	2	N	.62	50			0	D	.66	100			50	SE SC	.74	MW	50
7. MEAT COMBINATIONS	4			0	D	.47	25	D	.40	50			25	NC	.68	EC	50
8. COLD CUTS AND SAUSAGES	7			29	N	.62	0			29			14				29

TABLE 10.1 RELATION OF PREFERENCE TO BACKGROUND FACTORS SUMMARIZED BY FOOD CLASSES, SUB-CLASSES, AND GROUPS (CONT'D.)

CLASS, SUB-CLASS AND GROUP	NUMBER OF FOODS	AGE			EDUCATION			LENGTH OF SERVICE			SIZE OF TOWN			REGION OF ORIGIN			
		TREND	RANGE	PERCENT VARYING	TREND	RANGE	PERCENT VARYING	TREND	RANGE	PERCENT VARYING	TREND	RANGE	PERCENT VARYING	HIGH	RANGE	LOW	PERCENT VARYING
9. FRANKFURTERS	4	D	.73	75	D	.68	0			25			25				25
10. GROUND MEATS	8	D	.53	88			0	D	.32	38			25				12
11. FOWL	8			0			0			12			0				12
12. FISH	11	D	.59	45	D	.45	36	D	.70	73	N	.21	0	SE	.87	NC	55
VIII. POTATOES AND STARCHES	30		.21	13		.13	3		.24	30		.15	17	SE SW	.36	NE	53
A. BAKED BEANS	3			0			0			33			33				33
B. MACARONI, NOODLES AND SPAGHETTI	4			25			0			0			0	SW	.64	NC	25
C. WHITE POTATOES	14			7			7	N	.69	7			14				36
D. RICES	3			33			0	D	.94	100			67	SW	1.16	NE	100
E. SWEET POTATOES	6			17			0	D	.48	67			0	SE	1.46	NE	100
IX. SALADS	35		.22	40		.29	11	D	.57	57		.22	11	SW	.58	NE	57
A. FRUIT	9	N	.62	56			11	D	1.19	100			11				33
B. VEGETABLE	15	U	.54	53			13			33			13				47
C. COMBINATION	11			9			9	D	.55	55			9	SW	1.21	NE	91
X. SOUPS	12	U	.80	58		.22	25	N	.50	33		.11	17	SW	.54	SC	50
XI. VEGETABLES	54	U	.50	35	N	.35	46	N	.45	35	N	.43	37	SE	.37	GP MW	74
A. FLOWERS, FRUITS AND SEEDS	27	U	.45	26			48			30			41				67
B. LEAVES AND STEMS	12	U	.82	67			58	N	1.09	58			58				100
C. ROOTS AND BULBS	11			36			27			27			9				55
D. COMBINATIONS	4			0	D	1.36	50			25			25	SE	.81	GP	100

Table 10.2 Joint distribution of foods according to type of background preference effects on age and length of service

		Age				
	Type of Trend	D	U	N	None	Total
Length of Service	*D*	69	10	7	61	147
	U	0	5	3	4	12
	N	1	5	0	3	9
	None	27	30	2	150	209
	Total	97	50	12	218	377

Table 10.3 Joint distribution of foods according to type of background preference effects on education and age

		Education				
	Type of Trend	D	U	N	None	Total
Age	*D*	4	2	1	90	97
	U	6	5	6	33	50
	N	1	0	1	10	12
	None	18	11	14	175	218
	Total	29	18	22	308	377

Table 10.4 Joint distribution of foods according to type of background preference effects on education and length of service

		Education				
	Type of Trend	D	U	N	None	Total
Length of Service	*D*	8	6	12	121	147
	U	1	1	0	10	12
	N	1	1	1	6	9
	None	19	10	9	171	209
	Total	29	18	22	308	377

Table 10.5 Frequency of occurrence of each region as high- or low-preference areas for 143 foods showing important variation with region

	High		Low	
	Number	%*	Number	%*
NE	27	19	64	45
EC	6	4	18	13
NW	12	8	13	9
NC	9	6	10	7
GP	14	10	22	15
SE	46	32	20	14
SC	21	15	20	14
SW	54	38	11	8

*Percentage of 143. Percentages total more than 100% because of multiple listing of areas.

Chapter 11

RETROSPECT AND PROSPECT

When the surveys were initiated the objective was the practical one of obtaining information on food acceptance that would be useful in Service menu planning, particularly in the identification of suspected problem foods. This was accomplished by brief interim reports on each survey. But as the data accumulated it became evident that they had greater possibilities. It was then that the more extensive analyses reported here were undertaken in order to exploit further this information, to determine its value and its limits in the statistical sense, and to seek out certain problems and approaches that might hold promise for future research.

Food and Food Behavior. Food is an interesting topic for most people. Food and food behavior constitute an important aspect of the culture of a people, but the prime reasons for interest are personal. One's own food habits, his prejudices, his likes and dislikes tend to have a close and intimate meaning for him, some of it even subconscious. Many people tend to be "experts" on food preferences, not only in regard to their own habits and feelings but also in making assumptions about the attitudes and behavior of others. To some extent we all perceive the world in our own image, projecting to others what we think, feel and want. This is to some extent justified when we assume that our families, neighbors, and, in general, other members of the population of which we are part, will like the same foods we do. It was to be expected that many of the survey results would be congruent with prior expectations. However, the report is more than a formalized compendium of common knowledge. This is demonstrated by the many preference results that would not have been predicted, and even more by the major variations that were found as a function of the background factors. New facts and relationships are made available.

Human food behavior, like most human behavior, is very complex, being determined by multiple motives and directed and controlled by multiple stimuli. One cannot understand food behavior nor learn to predict and control it, which are the basic purposes of food acceptance research, with a single direction of effort. The forces that influence food choices and eating behavior include a set which is essentially unlearned, such as nutritional need, physiological state, and the sensory properties of foods. But those factors where learning plays a part are probably more important—cultural, economic, sociological, and additudinal—since it is here that most of the variability seems to arise. Man eats not just what his system needs nutritionally and what suits him physiologically; the range of food stuffs which fulfill these purposes is broad. He eats what is available, what he likes, what his culture defines as food, what his personal history dictates, and what society and his peers say he should eat. This listing could be extended much further. It is important to recognize that no single factor has predominant control, but that they interact in complex ways to determine final acceptance and usage.

This is the broad framework into which the present research should fit and in which the findings should be evaluated and interpreted. The research has dealt mainly with people's responses at the verbal level.

Further, the objective has been the establishment of population norms and trends rather than exploration of the reasons for individual food choices. A number of factors will have been important in determining the results although, of course, we see only their combined effects. There is no possibility of determining the effect of a single contributing factor from these data. On the other hand, it must be recognized that the one measure used, although it may have responded to a considerable number of the forces that determine food acceptance, could not have responded to all of them.

THE SURVEYS IN RETROSPECT

The original reason for undertaking these surveys was simply the need for information to be used in solving already recognized acceptance problems. This is developed in Chapter 1. Reformulation of these problems and their re-definition into a form amenable to attack by available methods can be considered an important accomplishment of the project. The need for problem analysis and definition did not end when the actual survey work started, but continued as the project grew in scope.

The selection of affective attitudes as the focus of study was more in the nature of a fortunate choice than an accomplishment of the project *per se*, although it was based to a considerable extent on the past history of failure in using "objective" measures in food acceptance investigations. Preliminary analysis suggested many advantages of using preference as an indicator of probable behavior. It was believed that this measure would be stable over time, various situations and methods of measurement. These beliefs were validated by later results. Further consideration of methodological problems led to selection of rating over other psychometric methods. In this we did no more than augment a growing trend toward recognizing the superiority of rating scales for problems of this nature, but the methodological research on the hedonic scale played an important part in confirming it as an effective instrument for use both in the surveys and for other food preference investigations.

An ancillary problem was the selection of background characteristics. These were an "extra", since this information was not needed to establish relative preferences; however, the possible contribution of such data to the understanding of food acceptance was recognized. This is borne out by the results. The interrelations of preference and background, as developed in Chapters 9 and 10, may have a lesser potential for practical application in the military than the over-all preference data, but they are of more general interest.

The use of probability sampling, described in Chapter 2, to determine **whom** to measure, lends confidence in the generalizability of the results. The basic method was borrowed from the Bureau of Census **via** the Army's Attitude Research Branch where it had previously been applied to attitude research problems. The method proved quite satisfactory for our purposes and we added little to it beyond application to another particular situation. In some of the later studies (Surveys 7 and 8) a different sampling plan was used but there was little change in the basic preferences. The actual selection of respondents and conduct of the surveys is described, and evaluated to some extent, in Chapter 3.

This is "how to do it" material, important to specialists in the field but not to many readers.

Chapters 4, 5, and 6 are in a supportive role to the mass of food preference data, yet they are the real core of the project. Without these findings, few conclusions could be made with confidence.

The treatment of the raw data constitutes one of the most important aspects of any investigation. A major problem was whether or not, or to what extent, to preserve the categorical nature of the data. Various possible procedures for summarizing the data are discussed in Chapter 4. The final choice was based on consideration of efficiency of analysis and presentation of results as well as the better tests of significance it afforded. The decision to use successive integers was based on the knowledge available at that time. Evidence given in Chapters 5 and 6 shows that this procedure was adequate, even though a single scale transformation applicable to all surveys is now available that would have offered certain advantages.

The very important problems of reliability are presented in Chapter 5. Two aspects were involved. The first was to provide measures of variability and tests of significance essential for assessing the importance of the observed differences. Here the solution was multiple, being a matter of accumulating various types of statistical evidence that related to the problem. The other aspect was the reproducibility of the survey results over time. This presented no particular difficulty; it was only a matter of applying standard analyses to the results of repeated surveys. But the results were revealing and gratifying. The high degree of reproducibility means that the results can be safely generalized over a range of time and places.

Reliability of results is a necessary but not a sufficient condition for meaningful research. Validity is the key. Studies well planned, well executed and skillfully interpreted may have intrinsic value, yet fall short unless their applicability to the basic problem can be demonstrated. Chapter 6 deals with the question of validity and its content occupies a pivotal position in relation to the entire project. That preference is closely associated with food acceptance is commonly assumed, but less often proven. It was a permissible assumption that the measurements we proposed could be used to make useful predictions about the food behavior of populations, but it was only an assumption. The ultimate concern about foods is consumption. Accepting this and other related objective criteria, the work reported in Chapter 6 demonstrated that preference, as measured in the surveys, is a very good predictor of actual food acceptance.

The remaining chapters are concerned with the pedestrian task of presenting the survey results, but they also serve to interpret and bring out points of interest. They cover characteristics of the respondents, relative preference status of foods and food classes, and preference as a function of population characteristics. There had to be much selection of data and much trial and error in working out the presentations. We sought to limit the tabular material to an amount that would not exhaust the readers' patience without discarding much that was felt to be meaningful and interesting. The primary solution of the problem of condensing the data for individual foods is represented in the master tables in

Chapter 8, and food groups and classes in Table 10.1. Whether the choices and compromises which were made were "right" and "best," the reader can judge by what is presented.

Applications: Present and Prospective

It would be unreasonable to demand that this project be evaluated entirely on the basis of the practical usefulness of the results, either immediately or potentially. The main value of the work may lie in its import for further research on food behavior, serving as a source of ideas and hypotheses and a ready fund of background information; however, no one will deny the importance of the pragmatic criterion. The information obtained is already being put to practical use in support of military feeding, and its potential value is seen in other areas.

Military Uses. Since the original purpose of the surveys was to provide guidance for the planning of A Ration menus, little more is needed here than to state that this purpose was fulfilled. Chapter 1 describes the normal Service feeding situation, and discusses the various factors, including food acceptability, that must be considered in its planning. In designing a series of menus, many decisions must be made which relate to the probable acceptability of particular dishes or types of food, e.g., whether a food is to be used at all, if served how likely it is to lower the acceptability of the meal, how often it should be served, in what form it should be prepared, or how it should be combined with other foods. The progress report made on each of the surveys provided mean ratings and, in many cases, various analyses of the data according to categories of response. Neither the analysis of background information nor the confidence range of the means was available at that time.

Systematic methods of applying the results have not been worked out. This is understandable since acceptability, as predicted by preference, is only one element in a system where usually several factors, variably weighted according to time or situation, have to be integrated subjectively. Nor can the contribution of the acceptability data to overall improvement in the ration be evaluated separately. Verification of the contribution of the results has had to be in terms of the expert opinions of the menu planners. They have indicated that the data permitted decisions to be made with more confidence and thus, presumably, with less chance of error.

Although the A Ration is used more often than any other ration, from a military point of view the operational rations are more important. The primary food research and engineering activity of the Quartermaster Corps is centered on the development of new rations for field operational use. Examples of these are foods preserved by dehydration and irradiation. A general principle has been to emphasize the development of foods that have counterparts in the A Ration and which may be presumed to be comparable in preference. Even though selection of the specific foods for development effort is in large part determined by technological feasibility, considerable leeway exists for choosing items on other bases. Here is where the survey data serve an important function in directing the effort toward those food types where the preference attitude ratings indicate that the chances for acceptance are good. It is reasonable to assume that introducing a new product is easier when that

product resembles an already acceptable food than when either it is totally unfamiliar or it is similar to an unpopular food.

Institutional Feeding. The feeding situations encountered in hospitals, industrial cafeterias, schools, penal institutions and other such establishments have many elements in common with Service feeding. Diets, except in unusual cases, cannot be adjusted to individual food preferences as they are, for example, in restaurants. Further, the financial resources are usually limited so that one does not have the recourse of offering wider variety and more expensive foods as a means of pleasing more people. Thus it is necessary, if anything is to be done about acceptance, to aim at mass preference, disregarding foods that are relatively unknown (and even those that are well liked but only by a few people) and concentrating on those where the proportion of dislike is low. Data such as those developed in these surveys for the Services could be used to improve institutional menus. Of course, there is the question of difference in population and whether they may affect preference enough to invalidate the present Army data for particular cases.

What evidence there is (Chapter 6) indicates that Army food preferences correspond generally with those of the entire American population. Perfect correspondence would not be expected, of course. This is demonstrated by the background data where we find many differences within the Army population itself as a function of age, length of service, region of origin, etc. Differences are likely to be accentuated when we compare the various institutional populations with the Army. For example, there will be wider age ranges and there will be differences due to factors not even considered in the present surveys. For example, we would expect sex to be important. Nonetheless, the institutional populations will still have much in common with the Army population. Probably the most important common factor is that they are all part of the same American population and have been subjected to the same, or similar, sets of cultural influences during the developmental years. For this reason, it may be assumed that the main trends in the serviceman's hierarchy of preference would be characteristic of the food preferences of most institutional populations. Of course, questions and doubts arising in connection with the non-correspondence of populations could largely be eliminated by surveying the particular institution to get more specific data, using the verified techniques which are described herein. Some institutions may find it feasible to do this.

Marketing. Another possible area of application of the findings of this project is in market analysis for the food industries. However, it is not claimed that the present survey data could be an adequate substitute for a market survey done specifically to evaluate a certain item or to answer a set of particular questions. Instead, these data constitute a background which might eliminate the necessity for a great deal of the usual preliminary work. One should not expect to predict specifics from this background, but it could give an idea of the underlying potential of a food product or type, including how the potential might vary with demographic factors. Again, as with institutional feeding, the approach and techniques that have been developed could be employed to create a new body of information.

RESEARCH IMPLICATIONS

Every research program has a core of descriptive data and observa-

tions. The results of our survey, besides serving as an end in themselves, constitute a part of this core for a food acceptance research program. The constancy of food preferences over a period of several years obviates the necessity for frequent resurveying and provides a stable base for research in maximizing acceptability of foods. The data presented here are necessary but not sufficient for the planning of optimally acceptable dietaries. The environmental contexts, both immediate and as more broadly conceived, in which foods are consumed must also be considered.

Some of the further problems or areas of investigation that have been recognized or given new emphasis as a result of the survey program are: the inter-effects of foods as combined into meals; the effect on preference and acceptance of repetitive serving of a limited number of foods; elaboration of the influence of cultural and social factors on food choices; effects of unusual conditions on patterns of acceptance; and finally, the question of the definition of acceptance itself.

The importance of two of these areas was anticipated early in the program. In Surveys 2 and 3 an additional page was included in order to explore desired frequency of serving as a variable that may contribute to food acceptance behavior. Certain aspects of menu combinations were studied in Surveys 4 and 5. Further work was undertaken, based upon the preliminary results obtained, and is still underway at the present time.

Menu Combinations. Meals consist of several courses eaten together. Does this practice affect food attitudes? It is quite likely that when several foods are combined (not as stew for example, but as steak and French fries), the combination takes on a unique preference and the individual components partially lose their identity. If this is the case, then it should be possible to increase the acceptance of a low rating food by properly combining it with other items. Likewise, full advantage of a high preference food might be lost by serving it with inappropriate accompaniments. Data obtained in the earlier surveys indicated that, in general, preference for a combination of foods is directly and closely related to preference for the items combined; however, there appeared to be exceptions. Recent research (2) has demonstrated the importance of such exceptions and has shown that they are related to food type and competitive class as defined in this report. Other work has shown that the prediction of free-choice menu selections can be much improved by taking cognizance of the preference ratings for two-item and three-item combinations as well as the preference ratings for the individual items. Extension of this line of investigation will show whether or not attitudes toward menus can contribute significantly to the prediction of food consumption and other aspects of food behavior.

Frequency of Serving. The psychological variable of desired frequency of serving of foods is positively correlated with preference. This was demonstrated in the early surveys. However, further evidence indicates that it predicts a part of consumption behavior that is not accounted for by preference.

Instead of asking: "How often would you like to eat this food?" A different question can be asked: "If you had been eating this food **X** times a week (or month) how well would you like it?" Such data yield

curves of preference **vs.** frequency, and these curves not only have different points of inflection but exhibit different shapes for different foods. Further investigation is needed to determine whether or not this variable can be used in predicting the course of changes in acceptance as a function of repeated serving of an item during a restricted time range.

Other Predictor Variables. That the determinants of food acceptance behavior and many is widely recognized. Besides the socio-psychological factors already discussed, physiologic need, and the sensory and compositional characteristics of the food may be considered. The composition in terms of fat, carbohydrates and protein appears to have some predictive value. Also, caloric density is related to the subjective satiety value of a food and both are related to consumption. Many of these variables have been investigated only to a minor extent, but they do appear to be promising as additional predictors of consumption.

However, preference accounts for 35 percent to 60 percent of the variation in consumption, depending on the test conditions, and it is unlikely that any other single variable will be found to be as effective a predictor. Therefore, although we may hope to improve prediction through addition of new variables, the generalized or attitudinal preferences of the type set forth in this report can be expected to remain the most useful kind of information for the planning of large scale feeding programs.

Criterion of Food Acceptance. Finally, there is the problem of the criterion of acceptance. What are we trying to predict? What kinds of end results, in a physical, objective sense, or what types of behavior are most representative of food acceptance? Which are most useful, or can best be supported on theoretical grounds? Various assumptions have been made at different times and for different purposes, although usually these assumptions have not been made explicit. Examples are (a) the quantity of food consumed, either the gross amount or the more sophiscated index of amount expressed in relation to a norm; and (b) the proportion of a population exhibiting choice behavior in a defined situation, e.g., taking an item from a cafeteria line or buying it at the grocery store. Both of these were employed in the validation studies reported in Chapter 6. Another logical candidate is the degree of pleasure or satisfaction experienced by the consumer. Note that if pleasure is accepted as the sole criterion, we do not have to "predict" it, because it is just another way of describing what preference scaling methods can measure directly. Determination of the proper criterion for food acceptance may be more a question of values than it is of research. In other words, one may have to determine, *a priori*, the outcome or the combination of outcomes which are important in the particular situation of interest.

This is a challenging area for investigations of both the experimental and the "armchair" type. Progress to date suggests that for the normal military feeding situation, a combination criterion including at least the three factors mentioned above will be most meaningful.

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